THE IRON TRADE REVIEW

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Tremendous Production of Pig Iron Continues

Steel Plants, Foundries and Many Other Manufacturing Concerns Working to Full Capacity—Pig Iron Dull With Some Price Concessions

Another remarkable chapter in the story of record-breaking production of pig iron was added by January, when the furnaces making coke and anthracite pig iron produced 2,790,080 tons. The record for the month total made in December, 1909, was broken in October of last year, again in December and once more in January, when the output exceeded that of December by 12,788 tons. The merchant furnaces made a gain of 24,143 tons, while the steel works furnaces sustained a loss of 10,068 tons. This loss was due to furnaces being compelled to go out of blast for repairs and not in any case to the desire of the owners to cut down production. The average daily output of 90,003 tons in January is a gain of 413 tons over December and marks the first time in the history of the American iron industry, in which an average output of 90,000 tons a day was maintained throughout a month.

New Buying

Buying of finished products since the first of the year has held up much better than present indications of lighter activity in the market suggest. The Steel Corporation's new bookings in January fell short of shipments by only a modest degree and the unfilled tonnage to be announced next week will show a loss of less than 100,000 tons. Shipments continued heavy last month and some good sized buying in various lines is maintained. Operations of the Steel Corporation continue on a high plane. The Illinois Steel Co. last month broke all records in its open-hearth ingot production by almost 30,000 tons. Its January output was about 270,000 tons.

Sound Quotations

Record-breaking was not confined to blast furnaces. In all sections, steel plants were working to full capacity, and, if statistics were available, they would probably make as good a showing for the steel makers as the pig iron statistics make for the blast furnace operators. For example, the Pennsylvania Steel Co., in January, produced at its Steelton, Pa., plant the heaviest tonnage of ingots of any month in the history of the works. The American Sheet & Tin Plate Co. last month broke all previous January records for specifications and shipments of steel sheets. The record exceeded that of December, which was one of the busiest Decembers in the history of the company. Some of the mills in the Chicago district also report extremely heavy specifications last month. Foundries throughout the country are maintaining the melt of pig iron and all indications from consumers of iron and steel products are that the present production is not greater than is justified by demand. These are among the substantial facts that offset some indications of weakness in a few directions.

Pig Iron

Softness in the pig iron market is extending. Sales have been made in the Chicago district at a concession of 50 cents, compared with recent prices, and a limited tonnage has been sold in the valley at $17.25, furnace, a decline of 25 cents. In the east, extreme dullness prevails, and in some sales of low grade irons, makers have shown a disposition to shade recent prices. Virginia No. 2X is now being offered for early as well as second quarter delivery at $15.50, compared with the recent quotation of $16 for first quarter and $15.50 for second quarter. The Tennessee Coal, Iron & Railroad Co. has made further sales aggregating 7,000 tons of southern pig iron for shipment to Genoa and Trieste.

Railway Buying

Active buying by railroads continues. The Great Northern has placed 1,500 tons of rails additional with the Illinois Steel Co., making its recent order about 40,000 tons. The Illinois Steel Co. has taken 7,000 tons for the Waterloo & Cedar Rapids, and the Carnegie Steel Co. 8,000 for the Western Maryland. The northwestern roads continue to negotiate for rails, but find difficulty in getting the deliveries desired. Some large tonnages will probably soon be placed by South American interests.

Price Advances

An advance in steel pipe prices is expected at a not far distant date on account of the present high price of skelp, from which the pipe is made. The prices of steel boiler tubes have been advanced $2 per ton. Quotations on iron tubular goods have not been changed.

Gompers Not Included in "Those Higher Up"

Says Wm. J. Burns, Who Declares He Has No Fight With the National Erectors' Association--Commissioner Drew Not Yet Ready to Defend Himself

New York, Feb. 3.—Detective Wm. J. Burns, when asked for a formal statement of his charges made against the National Erectors' Association and its commissioner, Walter Drew, dictated the following:

"I am going to go after my traducers, and Mr. Drew is one of them. I have no fight whatever with the National Erectors' Association; on the other hand, the individual members of the National Erectors' Association have treated me considerately always, and one of the firms of that association is responsible for my investigation of the McNamara case, and that is the McClintic-Marshall Construction Co.

"Mr. Drew was brought into this matter by me at the time of the arrest of Ortie McManigal and J. B. McNamara, after I had secured the confession from Ortie McManigal, and I did not want to bring him into it, but requested McClintic-Marshall to get behind me and employ lawyers who would meet and brush away the technicalities that I knew J. J. McNamara and his friends would attempt when the McNamaras would be apprehended.

"I have not found any fault with the National Erectors' Association; I have no fight with them; I have no complaint to make against them. But by way of explanation, I once took up the matter with some executive body of the National Erectors' Association and wanted them to back me up and let me go after the men higher up, and when I said that, I didn't mention Samuel Gompers and didn't mean Samuel Gompers; but I meant Tveitmoe and others like him who have thus far escaped conviction. Mr. Drew seeks to put me in the position of meaning Samuel Gompers when I mention 'those higher up'. This is absolutely false. My fight with Gompers and all that I have ever charged him with was the fact that the moment we arrested J. J. McNamara, Gompers, without a particle of investigation, charged me openly in the newspapers with framing up this case against the McNamaras, and planting that dynamite and finding it where I planted it. He discredited me all over the country, continuing to utter this falsehood, and he kept it up until the McNamaras themselves confessed and made a liar out of him, and then he didn't have the manhood nor the fairness to apologize or correct his statement, assuming that he has a perfect right to destroy the character of any man against whom he may have a grudge.

"It was Mr. Heyl, of Heyl & Patterson, and Mr. ————, of the McClintic-Marshall company, who induced me to call in Mr. Drew. And when I attempted to call him in on the long distance 'phone, he refused to come at my suggestion, and did not come until Mr. Heyl directed him to come.

"I have been a very busy man, and have permitted a number of efforts on the part of Mr. Drew and others to belittle me and attempt to steal from me the credit that was due me and my agency to pass unnoticed and uncommented upon, but I don't propose to stand for this any longer. I mean to do this now, especially after the Willard N. Jones matter, wherein a pardon was granted this man at Washington on the ground that Francis J. Heney and myself had improperly drawn a jury. This is a most outrageous falsehood, and the president and attorney general were cruelly imposed upon. I found that this falsehood was believed by many people, and when I became aware of this fact, I made up my mind that I didn't propose to stand idly by and permit myself to be traduced and lied about and my agency attacked, without hitting back, and that I propose to do hereafter.

"It has been sought by Mr. Drew to show that I have considered Samuel Gompers as the 'man higher up', and that he was the man I was seeking. This is a falsehood, and there was no ground whatever for such a statement. In all of my utterances, I have gone after Samuel Gompers the same as I have my other traducers, and charged him with uttering a falsehood when he stated that I framed the McNamara case and planted the dynamite and found it where I planted it, and he continued to utter this falsehood all over the country until the McNamaras made a liar out of him by confessing, and then he never had the manhood to retract the statement, and I don't care whether he is Samuel Gompers or who he is. Any man hereafter who tries to destroy my character or my business has got to prove what he says, and must fight me in the open and not through a guerrilla warfare in the dark."

Mr. Drew's Statement

"I have given to THE IRON TRADE REVIEW the names of those who are officially connected with the case and know all the facts," said Mr. Drew to THE IRON TRADE REVIEW. "They are the real and proper sources of information and no one else has the license to talk about the case publicly. The men to whom I refer are United States Attorney General Wickersham, United States Attorney Chas. A. Miller, of Los Angeles, Prosecuting Attorney J. D. Fredericks and Oscar Lawler, special United States attorney in the Los Angeles cases. I do not care to engage in any public discussion of this matter with Mr. Burns at this time. When the time comes for me to say something, I may do so. Any public discussion cannot help but do injury to the whole general cause."

Emery's Tribute to Drew

Washington, Feb. 2.—"I do not want to become involved in any controversy with anybody," said James A. Emery, when his attention was called to the assertions made by Detective Burns to the members of the Cleveland chamber of commerce. Mr. Emery has long been identified with employers' associations.

"I have known Walter S. Drew for ten years and have known him intimately and he is a man of the highest type. In addition to that, he is amply able to take care of himself. Charges against him implying or asserting anything contrary to that are absurd. He has done a work which places the whole country under obligations to him, but further than that I do not care to discuss the matter because I do not want to place myself either in the position of a butter-in or of a belligerent man carrying a chip on his shoulder either for myself or any other man."

All Records for Pig Iron Output Again Broken

Production in January Was 2,790,080 Tons and Average Daily Passes 90,000 Mark for First Time—More Stacks Active

Pig iron production continues at a record breaking pace, as shown by the figures for January, just compiled. New records for both total production and average daily output were established, the month's total being 2,790,080 tons and the average output 90,003 tons. It was the first time in American iron history that an average output of 90,000 tons a day was maintained during a month.

Records in pig iron output have been broken regularly during the past few months. The mark for a month's total, set in December, 1909, at 2,682,-

AVERAGE DAILY PRODUCTION.

	1913.	1912.	1911.
January	90,003	66,220	56,989
February	.....	72,372	63,617
March	.....	77,791	69,863
April	.....	79,254	68,163
May	.....	80,753	60,367
June	.....	81,125	59,109
July	.....	77,502	57,294
August	.....	80,650	61,995
September	.....	81,482	65,787
October	.....	86,569	67,486
November	.....	87,985	66,637
December	.....	89,590	65,558

702 tons, was broken in October of last year with 2,683,645 tons, in December with 2,777,292 tons and again last month. The average daily output record was set in February, 1910, at 86,748 tons, broken in November of last year with 87,985 tons, in December with 89,590 tons and again in January for the third successive month. A total month's production of 2,600,000 tons was reached for the first time in October, 1909, and again in December, 1909, the record standing until October, 1912. The figure was again surpassed in November, December's production went over 2,700,000 tons for the first time and last month the output barely fell short of 2,800,000 tons.

The output in January showed a gain of 12,788 tons over December. The gain was due to the increased activity of the merchant stacks. The merchant iron output last month was 780,037 tons, compared with 755,894 tons in December, a gain of 24,143 tons. The steel works, or non-merchant furnaces, produced 1,990,814 tons, against 2,000,882 tons in December, a loss of 10,068 tons. The average daily output showed a gain of 413 tons over December.

The number of stacks in blast on the last day of January was 298, compared with 291 on the last day of December, a net gain of seven. The gain was made by the merchant stacks, 13 being relighted and three blown out, a net gain of 10. Three steel works, or non-merchant furnaces, were blown out and none relighted, a net loss of three. In all, there were 13 stacks blown in last month and six blown out.

The production of spiegel in January was 12,104 tons, against 10,008

MONTHLY PRODUCTION.

	1913.	1912.	1911.
January	2,790,080	2,052,806	1,766,658
February	.....	2,098,796	1,781,285
March	.....	2,411,529	2,165,764
April	.....	2,377,621	2,044,904
May	.....	2,503,341	1,871,388
June	.....	2,433,737	1,773,282
July	.....	2,402,567	1,776,108
August	.....	2,500,163	1,921,832
September	.....	2,444,454	1,973,918
October	.....	2,683,645	2,092,061
November	.....	2,639,562	1,999,100
December	.....	2,777,292	2,032,301
Totals	2,790,080	29,325,513	23,198,601

tons in December, a gain of 2,096 tons. The output of ferro was 7,125 tons in January, compared with 10,508 tons in December, a loss of 3,383 tons.

Among the merchant furnaces blown in during January were: Susquehanna No. 1 of the Rogers-Brown Iron Co., on Jan. 13; Tod of the Brier Hill Steel Co.; Mary of the Ohio Iron & Steel Co., on Jan. 25; Anna of the Struthers Furnace Co., on Jan. 23; one Hokendauqua of the Thomas Iron Co.; Rockdale of the Rockdale Iron Co., on Jan. 3; Standard of the Standard Iron Co., on Jan. 8; Ivanhoe of the Ivanhoe Furnace Co., on Jan. 15, after being idle since June 1, 1911; Princess of the Princess Furnace Co., and Thomas of the Thomas Furnace Co.

Among merchant furnaces put out of blast were: One Ashland of the Ashland Iron & Mining Co., on Jan. 12, for relining, and Jisco of the Jackson Iron & Steel Co., on Jan. 2. The latter stack is expected in Feb. 10.

New Steel Company Organized

A company, which will probably be known as the Dover Steel Co., is being organized and will establish a mill in Canal Dover, O., for the manufacture of high grade hot and cold rolled sheets and open-hearth steel. A tract of 38 acres has been donated by the Penn Iron & Coal Co., as a site, and construction work will likely start in the spring. Incorporation papers will be taken out shortly, for a capitalization of about $1,000,000. Arrangements have been made with the Penn Iron & Coal Co. to furnish hot metal from its blast furnace for the mill. Among those interested are W. M. Parin, H. T. Myer, Archie Smith and M. S. Young, of Pittsburgh. A news item published in THE IRON TRADE REVIEW is credited with bringing about the above outlined arrangement.

JANUARY PIG IRON.

States.	No. of stacks.	No. in blast last day of month: Jan.	Dec.	Total tonnage made: Merchant.	Non-Merchant.	Totals: Jan.	Dec.
Pennsylvania	159	125	125	227,650	935,820	1,163,470	1,153,987
Ohio	72	59	57	161,123	464,362	625,485	625,429
Alabama	45	24	24	122,734	58,545	181,279	171,077
Virginia	21	8	6	26,877	.....	26,877	26,068
New York	27	20	19	90,148	103,580	193,728	188,273
New Jersey	7	1	1	5,833	.....	5,833	5,609
Illinois	26	22	22	50,348	230,620	280,968	293,047
Colorado	6	3	3				
Indiana	10	10	10				
Maryland	4	3	3				
Wisconsin	6	5	4	26,653	177,153	203,806	195,092
Kentucky	7	2	3				
West Virginia	4	3	3				
Tennessee	18	9	7				
Washington	1	.	.	41,657	20,734	62,391	70,905
Georgia	2	.	.				
Texas	3	.	.				
Minnesota	1	1	1				
Michigan	3	3	3				
Missouri	1	.	.	27,014	.....	27,014	27,289
Spiegel—All states						12,104	10,008
Ferro—All states						7,125	10,508
Totals	423	298	291	780,037	1,990,814	2,790,080	2,777,292

PITTSBURGH

Advance in Boiler Tubes---Coke Declines

Office of THE IRON TRADE REVIEW,
2148-49 Oliver Bldg., Feb. 4.

That the iron and steel market in this district continues on a decidedly firm basis, is the statement made by officials of the leading manufacturing interests in this territory. Despite the fact that the market for pig iron has been quiet, makers of finished products have not experienced any material change in conditions, although new buying is comparatively light. Specifications against contracts exceed mill tonnages in almost every instance, and a number of manufacturers broke all previous January records last month, from a standpoint of specifications against contracts and shipments. This is practically true in regard to makers of sheets, who advise that last month was the record-breaking January in their history.

The coke market is declining rapidly, and has dropped $1.25 since the close of last year, and yet the market is very far from being weak. There has not been much demand for fuel, and a number of consumers have requested that shipments be suspended. The old materials market has not yet showed any strength. Manufacturers of steel boiler tubes, on Feb. 1, advanced quotations $2 a ton; iron boiler tubes remained unchanged in prices. Frequent reports of an advance in the price of wire products are heard in the trade.

Pig Iron.—The market for pig iron continues quiet, although some dealers expressed the opinion that the next few weeks will witness a rather heavy buying movement. There has been considerable inquiry for small lots and sales have been made at prevailing market prices. Prices are firm.

W. P. Snyder & Co. announces that the average price of Bessemer and basic pig iron for January, based on sales of 1,000 tons or more, was $17.25 and $16.45, respectively, at valley points. About 45,000 tons of Bessemer and 6,000 tons of basic iron were involved. Nearly all of the Bessemer was obtained by the Jones & Laughlin Steel Co. The Bessemer average is slightly below that of December, which was $17.2962, and the January basic average is slightly above the December average price of this grade—$16.449. The average price of Bessemer, according to figures maintained by THE IRON TRADE REVIEW corresponds identically with that offered by the Snyder company. The Snyder company's basic average falls 5 cents below THE IRON TRADE REVIEW's monthly average for that grade. Talk is heard that a couple of non-merchant furnaces in the valley district will be blown out at an early date for relining and repairs. We quote all grades for first half delivery as follows:

(First Half.)

Bessemer, valley	$17.25 to 17.50
Bessemer, Pittsburgh	18.15 to 18.40
Basic, valley	16.50
Basic, Pittsburgh	17.40
No. 2 foundry, valley	17.50
No. 2 foundry, Pittsburgh	18.40
Malleable, valley	17.25 to 17.50
Malleable, Pittsburgh	18.15 to 18.40
Gray forge, valley	16.25 to 16.50
Gray forge, Pittsburgh	17.15 to 17.40

Ferro-Alloys—There is not the demand for ferro alloys this week that there was a week ago, although several small lots of ferro-manganese and ferro silicon have been sold for prompt delivery at prevailing market prices. One of the local brokers reports the sale of a rather small tonnage of ferro-manganese for forward shipment at $65, seaboard.

Fifty per cent ferro-silicon is quoted at $75, Pittsburgh, for either prompt or future delivery. Twelve per cent and lower grades of this alloy continue to be quoted at a range of $1 in price, although the minimum figures are practically nominal, inasmuch as dealers who did not advance prices five or six weeks ago, are practically out of the market. It is stated that small lots of ferro-titanium have been offered at slightly less than the regular market price for carload lots, which is 8 cents a pound.

We quote 80 per cent ferro-manganese at $65 to $75, Baltimore, for prompt delivery and $65 to $70 for forward shipment. The freight rate from Baltimore to Pittsburgh is $1.95 per ton.

Fifty per cent ferro-silicon is quoted at $75, Pittsburgh, for prompt and forward delivery; 12 to 13 per cent, $25 to $26, 11 to 12 per cent, $24 to $25; 10 to 11 per cent, $23 to $24; 9 to 10 per cent, $22 to $23, f. o. b. Globe, Jisco, and Ashland furnaces. The freight rate to Pittsburgh is $1.90. The foreign grades are held at $1 or more a ton over domestic prices.

On ferro-titanium we quote 8 cents per pound for carload lots; 10 cents per pound for 2,000 pound lots and over, and 12½ cents per pound in lots up to 2,000 pounds.

Plates.—One of the most encouraging features of the market this year has been the heavy buying of steel cars on the part of railroads in all sections of the country. Manufacturers of shapes and structural material already have enough orders on their books to necessitate maximum operations through nearly the entire year, and this is true also in reference to car builders. No large orders for cars have been closed locally. It is reported that the Louisville & Nashville has placed an order for 500 gondolas with the Mt. Vernon Car Shops. The Pennsylvania railroad system has closed for 100 locomotives for its lines west, distributing the order as follows: The American Locomotive Co., 70; and the Baldwin Locomotive Co., 30. This order was in addition to contracts placed for 65 locomotives about 10 days ago. Specifications against contracts in January exceeded mill tonnages by a considerable margin. Mills in a position to deliver material within the next three or four weeks continue to obtain fancy prices. We quote plates as follows:

Standard steel plates ¼ inch thick, 6¼ to 100 inches, 1.45c to 1.60c for forward shipment and 1.65c to 1.90c for prompt shipment. For extras, see card of Sept. 1, 1909.

Sheets.—The American Sheet & Tin Plate Co., today advised that specifications against contracts and shipments of sheet in January broke all previous January records. Although figures showing the tonnage involved are not made public, it is known that the January record exceeds that of December, one of the best Decembers in the history of the company, and one of the record breaking months experienced since the organization of the leading interest.

Nearly all of the large consumers have covered requirements through the third quarter and some makers are advising customers who have failed to place tonnages that it would be advisable to do so at an early date, because of a possible advance in prices in the not far distant future. A large number of manufacturing interests have been able to cover requirements through the second half of the year at prevailing quotations.

Several mills, in a position to fill orders within three or four weeks, continue to enjoy fancy prices, being

able to obtain from $1 to $3 a ton above the regular market without much difficulty. Demand for prompt material has not fallen off. A year ago, at this time, there was a tendency among some of the independent makers to shade the regular market price. No. 28 galvanized sheets, a year ago, were quoted at $2.90, or $12 a ton below the minimum market price of today. Other grades were correspondingly low at that time. The market today is decidedly firm at prevailing prices, which are as follows:

Flat Sheets.

Black Sheets.—Nos. 10-12 gage, $2 per 100 pounds; Nos. 13-14 gage, $2.05; Nos. 15-16 gage, $2.10; Nos. 17-21 gage, $2.15; Nos. 22-24 gage, $2.20; Nos. 25-26 gage, $2.25; No. 27 gage, $2.30; No. 28 gage, $2.35; No. 29 gage, $2.40; No. 30 gage, $2.50.

Tin mill sizes, Nos. 15-16 gage, $2.10 per 100 pounds; Nos. 17-21 gage, $2.15; Nos. 22-24 gage, $2.20; Nos. 25-27 gage, $2.25; No. 28 gage, $2.30; Nos. 29-30 gage, $2.35; Nos. 30¼-31 gage, $2.40; No. 32 gage, $2.45.

Blue Annealed.—Nos. 3-8, $1.70 per 100 pounds; Nos. 9-10, $1.75; Nos. 11-12, $1.80; Nos. 13-14, $1.85; Nos. 15-16, $1.95.

Galvanized.

Nos. 10-11 gage, $2.50 per 100 pounds; Nos. 12-14 gage, $2.60; Nos. 15-16 gage, $2.75; Nos. 17-21 gage, $2.90; Nos. 22-24 gage, $3.05; Nos. 25-26 gage, $3.20; No. 27 gage, $3.35; No. 28 gage, $3.50; No. 29 gage, $3.65; No. 30 gage, $3.80.

Roofing Sheets.

Net extras on all gages per 100 pounds.
Corrugated 2-inch, 2½-inch, 3-inch and 5-inch corrugation, 5c; 2 V crimped without sticks, 5c; corrugated 1¼-inch corrugation, 10c; 3 V crimped without sticks, 10c; pressed standing seam with cleats, 15c; plain roll roofing with or without cleats, 15c.

Painted Roofing.

12 to 18 gage, inc., 5c; 19 to 24 gage, inc., 10c; 25 to 28 gage, inc., 15c.

Tin Plate.—The market for tin plate is quiet, as heaviest consumers covered requirements some time ago. There has been some new demand, however, and specifying has continued at an almost phenomenal rate. Shipments to all parts of the country are heavy, and the market is decidedly firm at $3.60, for base size tins. Complaint is frequently heard from independent manufacturers regarding the prevailing quotation, it being claimed that it is too low to afford much profit. We quote as follows:

Coke tin plate, 100-pound basis, 14 x 20, $3.60, f. o. b. mill, Pittsburgh district.

Rails and Track Material.—Mills rolling rails in this district continue to receive rather heavy orders, and plants are being operated at maximum capacity in all parts of the country. Traction line companies are covering requirements for the present year, and lumber camp and mine interests are ordering rather heavy tonnages of light sections. Demand for Bessemer rails has been heavier than usual, much to the gratification of makers.

Specifications against contracts for spikes have been heavy and consumers are ordering material much earlier in the season than is generally customary, and it is said that railroads will begin repair work and extensions just as soon as the weather will permit. Rails are quoted as follows, with the base price of open-hearth steel sections at 1.34c per pound at the mill.

Fifty-pound and heavier, 1.25c per pound; carloads and less than 500 tons, 1.34c per pound; light rails on base weight of 40 to 45 pounds, 1.25c, the schedule on the other weights being irregular and subject to negotiations; angle bars for standard sections, 1.50c, base, Pittsburgh; track bolts, 2.40c to 2.50c, base, Pittsburgh.

Railroad Spikes.

4½, 5 and 5½ and 9-16	1.90c to 2.00c
3, 3½, 4, 4½ and 5 x ½	.10
3½, 4 and 4½ x 7-16	.20
3, 3½, 4 and 4½ x ⅜	.30
2½ x ⅜	.40
2½, 3 and 3½ x 5-16	.60
2 x 5-16	.80

Billets and Sheet Bars—There is practically no market for semi-finished steel; sales have become the exception rather than the rule, and it is difficult to base quotations upon actual transactions. Consumers covered first quarter requirements several weeks ago, and renewals were made the first of the month. Such transactions, however, do not involve new tonnages and have no direct effect upon the general market.

The entire country has been scoured by some of the leading consumers and it is advised there is little or no available tonnage. Bessemer billets today are quoted at $28.50, as against $20 a year ago at this time, which means that consumers are paying in the neighborhood of $8.50 a ton more for material than they were paying a year ago. We make no changes in our quotations, which, although nominal, represent the market as accurately as possible.

Bessemer 4 x 4 billets with 0.25 carbon and less are quoted at $28.50, with the usual extra for size and analysis, and open-hearth rolling billets, $29 to $29.50. Bessemer sheet and tin bars are quoted at $29 and open-hearth sheet bars are quoted $29.50 to $30, f. o. b. Pittsburgh and Youngstown, with full freight to destination added. Forging billets are quoted at $35 to $36, Pittsburgh.

Hoops and Bands. — Demand for hoops and bands has fallen off, but there is no let-up in specifying. Hoop makers have enough orders on their books to operate at maximum capacity for several months. Prices follow:

Hoops in carload lots, 1.60c to 1.70c, Pittsburgh, in less than carload lots, 1.65c to 1.75c; bands, 1.40c to 1.45c, base, with net extras, as per standard steel.

Merchant Bars.—Inasmuch as consumers of steel bars covered requirements before the beginning of this year, this market has been unusually quiet and it is not probable that any new buying will be done until the latter part of this quarter. Specifications against contracts last month exceeded mill tonnages in almost every instance.

Iron bars are quoted at a range from 1.70c to 1.80c. Cold rolled shafting is quoted at 59 per cent off for carload lots and 53 per cent off for less than carload lots. We quote as follows:

Common iron bars, 1.70c to 1.80c, Pittsburgh; Bessemer and open-hearth steel bars, 1.40c to 1.45c; plow and cultivator 1.40c to 1.45c; channels, angles, zees, tees, under 3 inch, 1.50c to 1.55c, all f. o. b. mill. The following differentials are maintained on steel: Less than 2,000 pounds and not less than 1,000 pounds of a size, 0.15 advance, less than 1,000 pounds of a size, 0.35. Cold rolled and ground shafting, 58 per cent off in carloads and 53 per cent in less than carloads delivered in base territory.

Muck Bar.—The market for muck bar continues quiet. No sales have been reported for several weeks, although it is understood that a couple of rather heavy tonnages have been offered. We quote muck bar nominally at $32, Pittsburgh.

Bolts, Nuts and Rivets.—No changes are noted in the market for nuts, bolts and rivets. Specifying continues heavy, and shipments are as badly deferred as they have been the last couple of months. There are no changes in quotations. Nearly all makers in this district have filled contracts taken at less than the prevailing price of today. We quote rivet prices, and nut and bolt discounts as follows:

Rivets

Button head structural rivets, 2.20c, cone head boiler rivets, 2.30c. Small rivets 75, 10 and 10 off.

Bolt and Nut Discounts

Carriage bolts, ⅜ x 6 inches, smaller and shorter, rolled threads, 75 and 10; cut threads 75 and 5; larger and longer, 70 and 2½.

Machine bolts with hot pressed nuts, ⅜ x 4 inches, smaller and shorter, rolled 75, 10, and 5; cut, 75 and 10; larger and longer, 70 and 7½.

Gimlet and cone point lag or coach screws, 80 and 10.

Hot pressed square, blank or tapped nuts, $5.70 off list; hot pressed hexagon blank or tapped, $6.30.

Cold pressed C. & T. square, blank or tapped, $5.70 off; hexagon, blank or tapped, ¾-inch and larger, $6.60 off; ½-inch and smaller, $7.20 off.

Structural Shapes. — The Pennsylvania railroad interests have awarded the contract for the Ohio connecting bridge, to be built at Sheridan, Pa., involving 6,600 tons, to the American Bridge Co., and it is said that the undertaking will be extended to about twice the size originally proposed.

Interest is being taken in the new city hall building, to be built in San Francisco, involving 7,000 tons, and a new department store, to be built on property owned by the Henry W. Oliver

estate, this city, involving between 7,000 and 8,000 tons. Shapes continue to be quoted at a range from 1.45c to 1.60c, although the bulk of the tonnage is going at about 1.50c for forward delivery. Prices follow:

Standard structural shapes, 1.45c to 1.60c for forward shipment. For extras see card of Sept. 1, 1909.

Iron and Steel Pipe.—The Philadelphia Co. has closed negotiations for 8,500 tons of iron oil country goods, for shipment to West Virginia, and it is understood this interest soon will be in the market for almost an equal tonnage of iron and steel line pipe.

One of the leading manufacturers has taken an order for 75 miles of 12-inch and 80 miles of 10-inch steel pipe for shipment to northwestern Canada. Talk of an early advance in the price of steel pipe is heard in the trade, although no official statement is made by any of the manufacturers. Discounts to jobbers, which are subject to the usual preferential discounts to the large buyer, are as follows:

Iron and Steel Pipe Basing Prices

STEEL.

	Black. Butt.	Galv. Butt.	Black. Lap.	Galv. Lap.
⅛, ¼ and ⅜ inch..	73	52½	..	..
½ inch	77	66½	..	..
¼ to 3 inch	80	71½	..	..
2 inch	..	..	77	68½
2½ to 6 inch.....	..	..	79	70½
7 to 12 inch	..	..	76	65½
13 to 15 inch	..	..	53	..
Extra Strong Plain Ends, Card Weight.				
⅛, ¼ and ⅜ inch..	68	57½	..	..
½ inch	73	66½	..	..
¾ to 1½ inch	77	70½	..	..
2 to 3 inch	78	71½	..	..
2 inch	..	..	74	65½
2½ to 4 inch.....	..	..	76	67½
4½ to 6 inch	..	..	75	66½
7 to 8 inch	..	..	68	57½
9 to 12 inch	..	..	63	52½
Double Extra Strong Plain Ends, Card Weight.				
½ inch	63	56½	..	..
¾ to 1½ inch	66	59½	..	..
2 to 2½ inch	68	61½	..	..
2 inch	..	..	64	57½
2½ to 4 inch	..	..	66	59½
4½ to 6 inch	..	..	65	58½
7 to 8 inch	..	..	58	47½

IRON.

⅜ inch	66	47	..	..
½ inch	70	57	..	..
¾ to 2½ inch.....	73	62	..	..
2 inch	..	..	69	59
2½ to 6 inch.....	..	..	71	62
7 to 12 inch.....	..	..	69	56
Extra Strong Plain Ends, Card Weight.				
⅜ inch	64	53	..	..
½ inch	68	61	..	..
¾ to 1½ inch.....	72	63	..	..
2 and 2½ inch.....	73	64	..	..
2 inch	..	..	67	59
2½ to 4 inch.....	..	..	71	62
4½ to 6 inch.....	..	..	70	61
7 to 8 inch	..	..	64	54
9 to 12 inch.....	..	..	59	48
Double Extra Strong Plain Ends, Card Weight.				
½ inch	58	50	..	..
¾ to 1½ inch.....	61	53	..	..
2 and 2½ inch.....	63	55	..	..
2 inch	..	..	56	50
2½ to 4 inch.....	..	..	61	55
4½ to 6 inch.....	..	..	60	54
7 and 8 inch.....	..	..	53	43

Plugged and reamed pipe is furnished at 2 points higher price, either butt or lap weld.

The above discounts are for full weight pipe, subject to a variation of 5 per cent, merchant pipe, when specified, being furnished up to 6 inches at one point higher discount (lower price).

Boiler Tubes.—On Feb. 1, the National Tube Co. advanced the price of steel boiler tubes $2 a ton. New discounts show 3½ to 4½-inch tubes listed at 70 per cent instead of 71 per cent, as was offered on the card of Jan. 1, 1913. Independent makers of steel tubes have adopted the new discounts, which are offered in this issue. Iron boiler tube makers have made no changes in quotations. Demand continues heavy, and specifications are liberal. Discounts are as follows:

IRON AND STEEL BOILER TUBES BASING PRICES.
(To Jobbers.)

	Steel.	Iron.
1¼ to 2 inch.....	60	48
2¼ inch	57	44
2½ and 2¾ inch.....	63	53
3 and 3¼ inch.....	68	55
3½ to 4½ inch.....	70	58
5 and 6 inch.....	63	..
7 to 13 inch.....	60	..

To destination east of Mississippi river will be sold at delivered discount for carloads lowered by 2 points, for lengths 22 feet and under; longer lengths, f. o. b. Pittsburgh. Usual extras to jobbers and boiler manufacturers.

Wire.—In some quarters, talk of an early advance in the price of wire products is heard, although manufacturers are silent regarding any immediate change in quotations. There has been some new buying, and specifications continue liberal. We quote as follows:

Wire nails, jobbers' carload lots, $1.75, retailers' carload lots, $1.80; cut nails (western makers), jobbers' lots, $1.70; painted barb wire, jobbers' carload lots, $1.75; retailers' carload lots, $1.80, with 40c for galvanizing; plain wire to jobbers in carloads, $1.55; and to dealers, in carloads, $1.60; polished staples, $1.75; galvanized staples, $2.15.

Wire Rods.—The market for wire rods is featureless. Consumers covered requirements several weeks ago, and there has been little or no new demand. Several interests, who usually are able to offer some material, are practically out of the market at the present time. We quote both Bessemer and open-hearth wire rods at $30, Pittsburgh.

Coke.—The coke market continues to decline, and according to some dealers furnace fuel has not yet reached its lowest point. Production in the regions has been at a heavy rate, and shippers have had no difficulty in moving cars. A large number of consumers have asked operators to suspend shipments, which has resulted in considerable coke being thrown upon the market.

Study of the situation shows that prompt coke today is selling at the price it brought Oct. 17, last year, just before it began to advance by leaps and bounds. By the end of the year prompt coke had gone to $4.25, ovens; today it is selling $1.25 below that figure. From Oct. 1 until Jan. 1, 48-hour fuel advanced $1.60 a ton. From Jan. 1 to Feb. 4, this same grade declined $1.25 a ton. Quotations offered for contract coke and foundry fuel have become nominal. Transactions have become so infrequent it is impossible to represent the market except nominally. The *Connellsville Courier* for the week ending Jan. 25, says production was 416,282 tons, a decrease of 13,545 tons, compared with the week before. Shipments increased 365 cars. Revised quotations are:

Connellsville furnace	$3.00 to 3.25
Connellsville furnace contract	3.25
Connellsville foundry	4.25
Connellsville foundry contract	4.00

Old Material.—The market for old material continues quiet, and shows no signs of immediate strength. Although quotations are low compared with those prevailing a couple of months ago, the general scrap market is strong in relation to the market of a year ago.

On Feb. 1, 1912, heavy melting steel was selling at $12.50, or $2.25 below the minimum price of today. On Feb. 8, last year, this grade had declined 25 cents in price and showed no signs of strength until the middle of March. Several dealers believe that 1912 history will repeat itself this year to the extent that scrap will demand higher prices the early part of next month. Consumers are well supplied with material and show no inclination to figure in the market even when dealers offer to sell at minimum prices. Considerable complaint is heard from middlemen on account of the frequency of embargoes against some of the mills in this district. We quote the market as follows:

Heavy melting scrap	$14.75 to 15.00
Rerolling rails	16.50 to 17.00
Malleable	14.00 to 14.50
Agricultural malleable	13.50 to 13.75
Bundled sheet scrap	13.00 to 13.25
Iron axles	26.00 to 26.50
Old iron rails	16.50 to 17.00
Stove plate	11.00 to 11.50
No. 1 wrought scrap	15.25 to 15.50
Old car wheels	16.25 to 16.50
Low phosphorus	18.00 to 18.25
Machine shop turnings	10.00 to 10.50
No. 1 busheling	14.00 to 14.50
Country mixed	11.00 to 11.25
Cast borings	10.25 to 10.50
No. 1 cast scrap	14.75 to 15.00

The Taylor-Wharton Iron & Steel Co., High Bridge, N. J., has been finding business very satisfactory since the consolidation of the Taylor Iron & Steel Co. and Wm. Wharton Jr. & Co., Inc., which was consummated at the end of last September. Checks for the preferred dividend at the rate of 7 per cent per annum were mailed on Feb. 1.

CHICAGO

Some Shading of Northern Pig Iron

Office of THE IRON TRADE REVIEW,
1328 Monadnock Blk., Feb. 4.

Specifications against contracts in finished lines received during January make that month one of the largest in a year. With some western producers, the total received was greatly in excess of shipments. Inquiries have fallen off slightly during the past week, as buyers are becoming accustomed to the fact that the mills are unable to take any additional business for anything like an early delivery. Railroad activity is keeping up to a degree that is surprising, many large car orders having been placed and inquiries for equally large lots being in the market. Railroads are heavy specifiers for both rails and track fastenings, the movement in the latter being record-breaking in many instances. Pig iron appears to be the only weak commodity in the present market, but this weakness is due to furnace conditions rather than any prospective lack of demand.

Pig Iron.—In spite of an almost entire lack of buying, the market for southern iron seems to be a little firmer and there is no indication of a disposition on the part of the larger Birmingham producers to quote lower prices. The market on Alabama pig iron is still quotable at $14 for first quarter delivery and $14 to $14.50 for second quarter and last half, but some Tennessee furnaces are still offering a $13.50, Birmingham, price. One of the latter has recently sold considerable iron at that figure and has marked its price up to a basis of $14, Birmingham.

Recent sales of northern iron made on a basis in the neighborhood of $17.50, local furnace, seem to be due principally to a desire on the part of producers to prevent any appreciable accumulation of stock. The recent tonnage taken by a Wisconsin melter at that price is reported as consisting of iron not applicable on existing contracts, and sold for immediate shipment. While this sale might affect the market to some extent, other transactions at $17.50, furnace, and on a contract basis for advanced delivery must be made before the market for that delivery is quotable on a lower basis. While other northern producers are disposed to shade $18, furnace, under like circumstances, they are inclined to adhere closely to that price on any contract tonnage.

Although there has been a marked scarcity of sales during the past week, some iron has changed hands on a basis which indicates the disposition of the southern furnaces. A melter in Davenport, Ia., has taken 1,000 tons for first half and third quarter delivery, 500 tons on a basis of $14, Birmingham, and 500 tons at $14.50. A consumer in Dubuque, Ia., has taken 100 tons for immediate shipment, and a Cedar Rapids foundry has taken the same tonnage for a like delivery. Both of the latter sales are understood to be on a basis of $14.50.

The following prices represent the market for the first half of the year, delivered in Chicago, except northern foundry and malleable Bessemer, which are quoted f. o. b. local furnaces:

	First half.
Lake Superior charcoal	$18.00 to 19.25
Northern foundry No. 2	18.00
Southern foundry No. 2	17.85 to 18.85
South'n Silveries, 5 per cent sil.	19.85
Jackson co. silv'r's 8 per cent.	21.90
Malleable Bessemer	18.00
Alabama basic	18.85

Merchant Bars.—Bar iron continues quotable at from 1.50c to 1.62½c, Chicago, and deliveries are being further delayed. Except in special cases, new business cannot be turned out in six months. Soft steel bars continue very firm, this material being called for in many of the heavy specifications, which are well distributed over all finished lines. Considerable new business is being offered in steel bars which the mills are still unable to take care of.

We quote f. o. b., Chicago, as follows:

Bar iron 1.63c to 1.62½c; hard steel bars, rerolled, 1.65c to 1.75c; soft steel bars, bands and small shapes, 1.63c; hoops, 1.63c; smooth finished machinery steel, 1 inch and larger, 1.78c; shafting 58 per cent off list for carload lots, 53 per cent off for less than carloads.

On iron and steel from local stock we quote as follows:

Bar iron, 1.95c per pound base; soft steel bars, 1.95c per pound base; soft steel hoops, 2.30c, full extras.

Structural Material.—Architects in this vicinity advise that plans for a number of large projects have been completed, but that further action is being delayed. This indicates that it will be some time before the present mill congestion in shapes is relieved. Plans for a number of new buildings, however, have been completed and bids will probably be asked in the near future. Among these are noted plans for the Dickinson Seed Co., for which at least 1,000 tons of shapes will be required. Consistent with maintaining conditions, prices on structural material are very firm.

A fair number of structural contracts were placed during the past week, the individual totals of which, however, were comparatively small, the aggregate being 2,903 tons. The leading interest is represented by a single contract for 566 tons taken from the Board of State Harbor Commissioners of San Francisco, for piers 9-A and 9-B, San Francisco. Noelke-Richards have taken 970 tons for an addition to the Claypool Hotel, Indianapolis, and the Wisconsin Bridge & Iron Co. has taken 249 tons from the Wisconsin River Power Co. for a power house at Prairie du Sac, Wis. The Chicago, Milwaukee & St. Paul Railway Co. has let a contract to A. Bolter's Sons for 228 tons of shapes for an office building on Fullerton avenue, Chicago, and the McClintic-Marshall company has taken 542 tons from the Wisconsin Steel Co., for a merchant mill at South Chicago. Other contracts include 200 tons let by the American Beet Sugar Co. for a mill building at Oxford, Cal., and 148 tons let by the Southwest Missouri R. R. Co., for a bridge over the Missouri Pacific tracks near Webb City, Mo.

We quote f. o. b., Chicago, as follows:

Beams and channels, 15 inch and under, 1.68c. For extras, see Pittsburgh report.

Store prices are as follows:

All angles, 3 inches and larger, including 6 inches, $2.05 per 100 pounds; angles over 6 inches, $2.15 per 100 pounds, base; beams, 3 to 15 inches, inclusive, $2.05 per 100 pounds, base; channels, 3 inches and larger, $2.05 per 100 pounds, base.

Rails and Track Fastenings.—Although there is some abatement in rail activity in this territory owing to a certain degree of mill congestion, there is no let up in the movement of track fastenings, specifications for which are still being received in great numbers. Prices on both rails and track fastenings are very firm

with tendencies toward advances, should the situation be unrelieved for very long.

We quote light rails, Chicago, as follows:

Light rails, carloads, 25 to 45-pound, 1.30c; 16 to 20-pound, 1.35c; 12-pound, 1.40c; 8-pound, 1.50c.

Light section relayers, 45 pounds and under, subject to inspection, $22 to $24; standard section relaying rails, subject to inspection.

And track fastenings f. o. b., Joliet, are as follows:

Angle bars 1.50c; railroad spikes, 1.95c; smaller size spikes, 1.75c, base; track bolts with square nuts, 2.30c to 2.40c.

Plates.—Some well informed members of the trade in this territory are wondering from what sources the steel necessary to fill the constantly increasing number of car orders will be obtained. Not only have good orders been placed during the week, but even heavier lots are stipulated in the current inquiries. The Illinois Central has ordered 1,000 gondola cars from the Pulman Co. The Harriman lines have ordered 800 work cars from the Bettendorf Axle Co. The American Refrigerator Transit has ordered 1,000 additional refrigerator cars from the American Car & Foundry Co., and it is reported that the Fort Dodge, Des Moines & Southern has ordered 200 box cars from the Lenoir Car Works. This last item has not been confirmed. The Denver & Salt Lake is negotiating with the American Car & Foundry Co. for 100 box cars and 20 stock cars, and the Pennsylvania is in the market for 5,000 all-steel gondola cars, 1,300 wooden-side gondola cars and 1,000 refrigerator cars. The Southern railway has ordered 200 box cars from the American Car & Foundry Co., and 100 gondola cars and 50 hopper cars from the Cambria Steel Co. The previously announced report that the Louisville & Nashville was in the market for 500 gondola cars has been confirmed.

We quote f. o. b., Chicago, as follows:

Tank plates, ¼ inch thick, 6⅝ to 100 inches wide, 1.68c. For extras, see Pittsburgh report.

Store prices are as follows:

Tank steel, ¼ inch and heavier, up to 72 inches wide, $2.05.

Bolts, Nuts and Rivets.—While a slight tendency toward quiet still is evident in the market for this material, new business continues to be received in sufficient volume to keep the time required for delivery about the same. Some producers report that it is impossible to make delivery in four weeks on an increased amount of business.

We quote prices on bolts, nuts and rivets as follows:

Rivets

Structural rivets, ¾ to 1¼ inches, 2.38c, base, Chicago, in carload lots; boiler rivets, 0.10c additional.

Bolt and Nut Discounts

Carriage bolts up to ¾ x 6 inches, rolled thread, 75-10; larger sizes, 70-2½.

Machine bolts, up to ¾ x 4 inches, rolled thread, 75-10-5; cut thread, 75-10; larger sizes, 70-7½.

Hot pressed nuts, square head, $5.70 off per cwt.; hexagon, $6.30 off per cwt.

Sheets.—Sheet makers in the west report no material change in market conditions, as business activity is being fully maintained. From the weakness which was evident some months ago, the sheet market has developed strength equal to other finished lines and no difficulty is being experienced either by producers or jobbers in keeping quotations up to the level recently established.

We quote f. o. b., Chicago, as follows:

Blue annealed, No. 10, 2.25; No. 12, 2.20c. Box annealed, No. 28, 2.90c. Galvanized No. 28, 4.15c.

For mill prices, see Pittsburgh report. Freight to Chicago, 18 cents.

Wire Products.—Recent reports of labor difficulties in Pittsburgh wire mills received in this territory, so far have had no effect on the market. The leading interest continues to receive heavy specifications and in spite of the volume of business which has been booked in the past few weeks is still able to make deliveries with reasonable promptness.

We quote f. o. b., Chicago, as follows:

Wire nails, jobbers' carload lots, $1.93; retailers' carload lots, $1.98; retailers' less than carload lots, $2.03; painted barb wire, jobbers' carload lots, $1.93; retailers' carload lots, $1.98; retailers' less than carload lots, $2.03, with 40c for galvanizing; plain wire, jobbers' carload lots, $1.73; retailers' carload lots, $1.78.

Merchant Pipe and Tubes.—There is very little change in this market from the previous week. In spite of the fact that dullness is usually evident at this season, western pipe makers report a very satisfactory volume of business. The delivery situation, however, has been relieved to a considerable extent.

We quote store prices f. o. b., Chicago, as follows:

Iron and Steel Pipe Basing Prices

	Steel. Black.	Steel. Galv.	Iron. Black.	Iron. Galv.
Butt.				
⅛ inch and ¼ inch.	69.2	48.2	62.2	42.2
⅜ inch	73.2	62.2	66.2	....
½ inch	76.2	67.2	69.2	57.2
¾ inch to 1½ inch	76.2	67.2	69.2	57.2
Lap.				
2 inch	73.2	64.2	65.2	54.2
4½ inch to 6 inch..	75.2	66.2	67.2	57.2
Card Weight.				
7 inch to 12 inch...	72.2	61.2	65.2	54.2
Extra Strong Plain Ends.				
Butt.				
⅛, ¼, ⅜ inch.....	64.2	52.2	58.2	46.2
½ inch	69.2	57.2	63.2	51.2
2 inch to 3 inch....	74.2	62.2	....	....
Lap.				
2 inch	70.2	58.2	64.2	52.2
7 inch to 8 inch....	64.2	52.2	58.2	46.2
Double Extra Strong.				
Butt.				
½ inch	57.2	45.2	....	....
¾ inch to 1½ inch	60.2	48.2	....	....
Lap.				
2 inch	58.2	48.2	....	....
4½ inch to 6 inch..	59.2	47.2	....	....
7 inch to 8 inch....	52.2	40.2	....	....

Tubes

Diameter.	List price.	Lap weld steel, per cent.	Charcoal iron, per cent.	Cold seamless, per cent.
1	30			57½
1¼	28			52½
1½	27			47½
1¾	22			
2	20			
2¼	22	51	40 36	35
2½	28			
2¾	31	56	43¼	40
3	34			
3¼	40	61	47	46
3½	43			
4	55			
4½	62	63	50	46
5	76	56		
6	102	56		

Cast Iron Pipe.—The United States Cast Iron Pipe & Foundry Co. has taken 1,000 tons of water pipe from Yankton, South Dakota, and about 1,500 tons from the Indianapolis water company, Indianapolis, Ind. The letting for the requirements of San Diego, Cal., for a very good tonnage was up yesterday. There are evidences of increased activity in the market and it is probable that much business will be placed within the next 30 days.

We quote, f. o. b. Chicago, as follows:

Four-inch water pipe, $31, 6 to 12 inches, $29, larger sizes, $28, gas pipe, $1 a ton higher.

Old Material.—There appears to be but little prospect of a change in the conditions which continue to cause weakness in the market for old material. Scrap continues to be offered in good quantities by the railroads and consumers are not anxious to buy, having tonnage on hand sufficient for some months. In addition to railroad lists, the production of scrap from finished material is very heavy. It is probable that before there can be any great strength in the scrap market, railroad offerings must be absorbed and some decrease must take place in the business of scrap producers. The effect of the

output of the latter is keenly felt, as scrap is produced without any corresponding consumption. The St. Louis & San Francisco has asked for bids on 426 tons of scrap of which the principal items are 55 tons of cast iron borings and 50 tons of malleable. Bids were closed Feb. 3. The Northwestern has issued a list containing 3,000 tons, the principal item being 700 tons of No. 1 steel rails. The Frisco has asked for bids the B. & O. C. T. also has issued a list containing about 400 tons. The New York Central and Grand Trunk each has sent out a small list.

We quote for delivery in consumers' yards, Chicago, as follows:

Gross Tons.

Old car wheels	$17.00 to 17.50
Old iron rails	16.50 to 17.00
Rerolling rails (5 ft. and over)	15.75 to 16.25
Old steel rails (3 ft. and und.)	14.50 to 15.00
Frogs, switches and guards	12.75 to 13.25
Heavy melting steel	12.50 to 13.00
Shoveling steel	12.25 to 12.75

Net Tons.

No. 1 R. R. wrought	$12.25 to 12.75
No. 2 R. R. wrought	11.50 to 12.00
Arch bars and transoms	16.50 to 17.00
Knuckles, couplers and springs	12.75 to 13.25
Shafting	16.50 to 17.00
Iron car axles	21.50 to 22.00
Steel car axles	18.25 to 18.75
Locomotive tires	13.50 to 14.40
Dealers' forge	10.75 to 11.25
Pipe and flues	9.00 to 9.50
No. 1 cast	13.50 to 14.00
No. 1 busheling	10.50 to 11.00
No. 2 busheling	7.75 to 8.25
No. 1 boiler cut	9.25 to 9.75
Boiler punchings	13.00 to 13.50
Cast and mixed boring	7.00 to 7.50
Machine shop turnings	8.00 to 8.50
Railroad malleable	13.50 to 14.00
Agricultural malleable	12.25 to 12.75
Angle bars, splices, etc., iron	16.50 to 17.00
Angle bars steel	12.00 to 12.50
Stove plate and light cast scrap	11.00 to 11.50

CLEVELAND

Jobbers Doing a Rushing Business

Office of THE IRON TRADE REVIEW, Penton Bldg., Feb. 4.

Iron Ore.—A very large percentage of ore for sale for this year's delivery has been disposed of and the market is now very quiet. Attention is being concentrated upon getting out the tremendous tonnage which it is expected will be shipped during the coming season. There is, however, still some high-grade ore for sale. One firm which has sold over 6,000,000 tons of Bessemer and non-Bessemer has about 200,000 tons of Bessemer ore on the market.

On base ores with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range Bessemer, $4.40; Mesabi Bessemer, $4.15; old range non-Bessemer, $3.60; Mesabi non-Bessemer, $3.40.

Pig Iron.—The market is extremely dull and there has been some shading on the valley price of No. 2 foundry, which had been held firmly at $17.50, valley. This quotation has been shaded about 25 cents in some cases, but most sellers are still adhering to $17.50. The foundry melt is keeping up and foundries are taking their iron as fast as they can get it. Very little is heard of competition from southern iron. For delivery during the first half of this year, we quote as follows, delivered Cleveland:

No. 1 foundry	$18.25
No. 2 foundry	17.75
No. 2 southern	17.85
Bessemer	18.15
Lake Superior charcoal	19.10
Silveries 8 per cent silicon	21.55
Bessemer ferro, 14 per cent	29.55

Coke.—The coke market is quiet and prices are tending downward. Sellers are offering to contract for furnace coke at $3 to $3.25, and to sell for prompt delivery at $3.25, while the usual quotations on foundry coke are $3.50 on contract and $3.75 for prompt delivery.

Connellsville furnace coke, $3.00 to $3.25 for prompt delivery, and $3.00 to $3.25 on contract; Connellsville foundry coke, $3.75 for prompt, and $3.50 on contract.

Finished Material.—The most interesting development of the past week has been the remarkable increase in demand for finished materials from stock, especially for steel bars. Jobbers have been doing a rushing business at premium prices. While some mills seem to be giving somewhat better delivery, others are not, and, on the whole, the mill situation shows little, if any, change. Buyers are still perfectly willing to pay premium prices for anything approaching prompt delivery. On sales from eastern mills, as high as 1.70c at the mill for delivery in about four weeks is paid without objection.

Old Material.—General sluggishness continues to rule the scrap market. Fair demand is being made by foundries in Cleveland and surrounding towns for No. 1 machinery cast, while some inquiry from mills for cast borings has developed. The activity ruling in these grades is the only interest that is manifest. Revised quotations follow:

Gross Tons.

Old iron rails	$17.75 to 18.50
Old steel rails (under 6 ft.)	15.00 to 15.50
Old steel rails (over 6 ft.)	16.25 to 16.75
Relaying rails	25.00 to 26.00
Old steel boiler plate	11.50 to 12.00
Malleable iron (railroad)	14.50 to 15.00
Steel Axles	19.50 to 20.00
Axle turnings	10.00 to 10.50
Malleable iron (agricultural)	12.00 to 12.50
Heavy steel	13.00 to 13.25
Country mixed steel	11.00 to 11.50
Bundled sheet scrap	11.00 to 11.50

Net Tons.

No. 1 R. R. wrought	$13.75 to 14.00
No. 1 busheling	12.00 to 12.50
No. 1 machine cast	12.50 to 13.00
No. 1 dealers' wrought	11.50 to 12.00
Machine shop turnings	7.00 to 7.50
Pipes and flues	9.50 to 10.00
Wrought drillings	7.00 to 7.50
Cast borings	7.00 to 7.50
Stove plate	10.00 to 10.50
Wrought iron arch bars	17.00 to 17.50
Wrought iron piling plate	16.00 to 16.50

ALLIS-CHALMERS

Properties Sold to Chairman of the Reorganization Committee.

The Milwaukee and West Allis properties of the Allis-Chalmers Co. were sold, Feb. 3, by Special Master Commissioner Gerry W. Hazelton, of Milwaukee, to J. H. McClement of New York, chairman of the reorganization committee and representative of the buyers' committee. The consideration was $2,250,000, Mr. McClement's bid being the only one made. The sale was made for the purpose of obtaining money with which to pay interest on the outstanding first mortgage bonds in the receivership. The outstanding bonds are held by the Continental & Commercial Trust & Savings Bank of Chicago and the interest amounts to $815,042.

Attorneys for Nathan Eismann, of Boston, who fought against the receivership, served notice on the special master that if the motion by Eismann to set aside the receivership, which was denied by United States District Judge Geiger, be sustained by the United States Court of Appeals, the sale would not be effective. This was admitted by the special master.

The Monitor Stove & Range Co., Cincinnati, recently opened a city office at 19 E. Third street, that city.

CINCINNATI

Some Pig Iron Still Held at $13

Office of THE IRON TRADE REVIEW,
503 Mercantilt Library Bldg., Feb. 4.

Pig Iron. — The southern market shows a slight improvement, which is accredited largely to the fact that one Tennessee furnace has advanced its price to $14, Birmingham basis, for its No. 2 foundry iron, for spot or first half shipment, and also that a slightly better feeling of confidence has appeared among the dealers. It could hardly be said, however, that the market has been placed upon a more substantial footing, as there have been no developments recently to warrant such a statement. Southern prices still range from $13.50 to $14.50, Birmingham, for first half delivery, which include both furnace iron and the higher-priced resale iron. There is a little of this latter grade in both Tennessee and Alabama still to be had at $13, Birmingham basis, but it is confined to a certain limited amount.

There is a slightly better demand for northern iron, but the inquiries are not general. The situation in southern Ohio has shown no change during the past week, and No. 2 foundry iron from that district, including both resale and furnace grades, is being held at from $16.50 to $17, Ironton basis, for the first half. These prices would probably extend over into the second half, also, on attractive orders.

The most important inquiries received call for 1,000 tons of northern iron for first half delivery from a southern Ohio user, and for 2,000 tons of assorted grades for the last half from a central Indiana melter. There is also an inquiry for 1,000 tons of northern iron from central Ohio for the first half, and 200 tons for February shipment from the same part of the state. With freight rates $3.25 from Birmingham, and $1.20 from Ironton, we quote Cincinnati prices as follows:

Southern foundry No. 1	$17.25 to 17.75
Southern foundry No. 2	16.75 to 17.25
Southern foundry No. 3	16.25 to 16.75
Southern foundry No. 4	16.00 to 16.50
Southern gray forge	15.75 to 16.25
Mottled	15.75 to 16.00
Southern No. 1 soft	17.25 to 17.75
Southern No. 2 soft	16.75 to 17.25
Standard southern car wheel	27.25 to 27.75
Northern No. 2	17.70 to 18.20
Northern No. 3	17.20 to 17.70
Northern No. 4	16.95 to 17.45
Silveries 8 per cent silicon	20.70 to 21.20

Coke.—The coke market is a little softer. Demand has fallen off considerably, and production is gradually being increased, as the ovens seem to have caught their stride, and, being aided by the good weather, are producing more coke at present than at any time this year. Users are buying only in small lots as their requirements demand, and it is generally supposed that in most cases they are hoping that the market will recede still further before placing any contract orders of any size. Spot shipment coke especially has declined in price during the past week and Connellsville furnace can now be had at from $3.25 to $3.50, ovens, and Connellsville foundry at from $3.75 to $4, ovens, for this delivery. For contract shipment, Connellsville 48-hour coke is held at from $2.75 to $3, and 72-hour coke at from $3.50 to $3.75. Wise county makes are about the same as those from the Connellsville fields. Practically the only coke to be had for sale from the Pocahontas region is spot furnace coke, which is given at from $2.85 to $3. There is very little foundry coke in this district and its price is about from $3.50 to $3.75, ovens, for any delivery. New River coke is also scarce and furnace coke there is being held at $3, for both spot and contract shipment. We quote below from the leading coke producing fields as follows:

	Prompt shipment.	Contract.
Connellsville district:		
Foundry coke	$3.75 to 4.00	$3.50 to 3.75
Furnace coke	3.25 to 3.50	2.75 to 3.00
Wise county district:		
Foundry coke	$3.75 to 4.00	$3.50 to 3.75
Furnace coke	3.25 to 3.50	2.75 to 3.00
Pocahontas district:		
Foundry coke	$3.50 to 3.75	$3.50 to 3.75
Furnace coke	2.85 to 3.00	2.85 to 3.00
New River:		
Foundry coke	3.25 to 4.25	$3.00 to 4.00
Furnace coke	3.00 to 3.25	3.00 to 3.25

Finished Material.—The local sheet mill has resumed full operations after the recent forced shutdown caused by the high stage of the Ohio river. Specifications are coming in very well and the mill is from 8 to 10 weeks behind on deliveries. Prices which were advanced last week are being held firm at 2.35c for black sheets No. 28 gage, and $3.50c for galvanized sheets No. 28, Pittsburgh basis.

A number of the warehouses have advanced prices on beams, channels, bars, angles and plates, 5 cents per 100 pounds within the past week. Business remains good, with the best demand generally for building materials. We quote warehouse prices f. o. b., Cincinnati, as follows:

Steel bars, 2.05c to 2.15c, base; iron bars, 2.00c to 2.10c, base; structurals, 2.10c to 2.25c, base; plates, ¼ inch and over, 2.10c to 2.25c, base; sheets, blue annealed No. 10, 2.25c to 2.90c, base; rivets, cone head, 2.60c to 2.70c, base; cold rolled shafting, 58 to 55 per cent off on round, and 55 to 50 per cent discount on flat, square and hexagon; steel hoops, 2.10c to 2.20c base; full extras; boiler tubes as follows: 1½ inch, 46 per cent discount; 1¾ to 2¼ inch, 57 per cent discount; 2½ inch, 60 per cent discount; 2¾ to 3¼ inch, 65 per cent discount; 3½ to 4½ inch, 68 per cent discount; 5 to 6 inch, 60 per cent discount; soft steel cold twisted concrete bars, cut to length as follows: ¾ inch square and larger, 2.15c to 2.25c; ⅝ inch square and larger, 2.25c to 2.35c; ½ inch square and larger, 2.35c to 2.45c; 5-16 inch to ⅜ inch square and larger, 2.25c to 2.65c; and ¼ inch square and larger, 2.65c to 2.75c.

Old Material.—The scrap iron market has steadily weakened within the past week, and prices in general have declined about 25 cents a ton. Users still decline to buy in lots of any size, as they are only taking enough scrap to fill their requirements for short periods. The lack of confidence also is very apparent and dealers in several cases have revived notices to postpone shipments until a better view of the market can be obtained. No. 1 machine cast, No. 1 busheling and No. 1 yard wrought still continue best in demand, although a very small proportion is being sold in comparison with what should be. The foundries appear to be fairly busy, but they are also pretty well stocked up in regard to their scrap iron needs, which condition seems to be general. We quote below prices dealers will pay and also dealers selling prices f. o. b. yards, Cincinnati, as follows:

Gross Tons.

Old iron rails	$13.50 to 14.00
Old steel re-rolling	12.00 to 12.50
Old iron axles	18.00 to 18.50
Heavy melting scrap	11.50 to 12.00
Relaying rails	20.75 to 21.25
Bundled sheet scrap	9.00 to 9.50

Net Tons.

Old No. 1 R. R. wrought	$10.75 to 11.25
No. 1 yard wrought	9.25 to 9.75
No. 1 machine cast	11.00 to 11.50
No. 1 busheling	9.00 to 9.50
Stove plate	7.75 to 8.25
Machine shop turnings	7.00 to 7.50
Cast borings	7.25 to 7.75
Heavy turnings	7.50 to 8.00
Mixed cast	9.50 to 10.00
Breakage	7.25 to 7.75
Malleable	9.00 to 9.50

PHILADELPHIA

Less Congestion in East---Pig Iron Easy

Office of THE IRON TRADE REVIEW,
Philadelphia, Feb. 4.

There is an easier condition to the eastern iron and steel industry. The congestion in deliveries is not so acute and new business is not so heavy. This statement is subject to qualification, however, as to the eastern plate mills, which continue to receive a large volume of new orders at their advanced prices and are not gaining on deliveries. Finished prices remain strong. Works operations are on a full scale, the Steelton plant of the Pennsylvania Steel Co. having produced in January the largest ingot tonnage in its history. Pig iron is inactive and prices show continued softness, but consumptive conditions are very sound. Several grades have sold at lower levels. The Bethlehem Steel Co. has re-entered the scrap market as a buyer after many months absence. This development may help the eastern scrap market, which is now very dull and weak.

Pig Iron.—Makers and buyers of pig iron in this district are still waiting upon the other to take the initiative in giving the market renewed activity, but neither seems disposed at present to assume the lead. The furnaces appreciate that for them to force the market in its present condition would only weaken it, while buyers, scenting lower prices, see no reason to take other than a receptive position, especially as their requirements for some months ahead are well covered. The softness in the general market continues and lower prices are coming out here and there in various grades, which demonstrate the greater freedom by which consumers are able to shade former schedules. The buying activity of the market, however, remains so restricted that the true strength of prices remains questionable. All reports unite to show favorable consumptive conditions in this territory and the foundries and steel works continue insistent for prompt deliveries against their orders.

Standard No. 2X in the Lehigh and Schuylkill valleys remain generally at a range of about $17.50 to $17.75, furnace, or $18.25 to $18.50, delivered Philadelphia. On small lots that are moving, the $18.50, delivered, price is the maximum, and attractive business would go lower. As reported, Lehigh valley No. 2X has sold down to $17, furnace, but this level is exceptional. In the Lebanon and some other eastern districts, the $17, furnace, price is more openly made. Virginia iron also shows more easiness in that some makers will accept the $15.50, furnace, price for early delivery No. 2X, where heretofore this price has only applied to second quarter and $16, furnace, has been asked for shipment to April. The leading Virginia maker will also accept third quarter business at $15.50, furnace. Forge iron, both for pipe and puddling mill purposes, is lower. A Susquehanna valley mill purchased about 1,500 tons of standard forge for the next several months at $17.35, delivered. Some smaller lots of forge have also been sold. For good pipe forge, $17.25, delivered along the Delaware river, about represents the market. Some lots of northern white iron of extremely low grade character, have been sold to a Delaware river pipe maker at $16.75, delivered. This buyer will not pay over $17, delivered, for pipe iron at present and has declined offers of southern No. 3 at $17.20, delivered, or $13, Birmingham. The basic market continues to show an absolute absence of interest among buyers and whether an $18, delivered, price represents the minimum, is problematical. A Chester steel foundry's inquiry for 1,000 tons of low phosphorus is understood to have been placed. Otherwise, there is little activity in low phosphorus metal, but the market is strong. Lebanon makers continue to sell carefully because of their heavy first half order books. A Philadelphia buyer is figuring on 1,000 tons of additional malleable for February.

We quote for prompt and first quarter shipment delivered to consumers' plants, in Philadelphia and vicinity, as follows:

Eastern Pa. No. 1X foundry	$18.50 to 18.75
Eastern Pa. No. 2X foundry	18.25 to 18.50
Eastern Pa. No. 2 plain	18.00 to 18.25
Standard forge (Eastern Pa.)	17.25 to 17.50
Basic (Eastern and Central Pa.)	18.00
Virginia No. 2X	18.00 to 18.50
Southern No. 2	17.50 to 18.00
Malleable	19.50 to 20.00
Standard low phos. Phila.	24.50

Iron and Steel Bars.—A leading independent steel bar maker in the eastern Pennsylvania district is taking contracts for third and fourth quarter delivery, guaranteeing deliveries within 45 days, if specifications are filed by the fifteenth of the preceding month. These contracts are usually being taken at 1.40c, Pittsburgh. Makers show no great desire to push contracts for the third and fourth quarters, but some business of this kind is moving. Prompt steel bars continue to be sold by smaller mills at 1.85c, tidewater. Sales of early concrete bars at 1.55c, Pittsburgh, or 1.70c, Philadelphia and vicinity, are noted. The Jones & Laughlin Steel Co. is the low bidder on 800 tons of bars and shapes for Panama shipment, bids for which were opened last week. Bar iron continues firm at 1.60c, eastern mill, as a minimum, with a good volume of early business. There is not much contracting forward being done, however. Philadelphia mills will accept 1.60c at the plant.

We quote for delivery to consumers' plants in Philadelphia and vicinity: Steel bars at 1.55c to 1.60c on contract and common bar iron at 1.65c to 1.75c. Prompt steel bars on mill shipments are quoted at 1.85c to 1.95c delivered and from store are quoted at 2c to 2.15c, delivered. Cut nails are quoted from $1.85 to $1.90, Philadelphia. Shafting is quoted at 58 and 53 off in base territory.

Plates.—Car builders have been turning more actively to eastern plate makers for the deliveries which they are unable to obtain from other lower-priced mills. One very large inquiry from this source is now pending and several good-sized orders have lately been booked by eastern mills at their schedule of 1.60c, Pittsburgh minimum. One inquiry for 6,000 tons of plates for elevated railroad construction in New York City is before the mills. There is no let-up in the volume of new business coming to eastern Pennsylvania mills and their deliveries remain unchanged at from four to six weeks on lots of any size. A small lot which could be worked into rolling schedules for immediate shipment was sold at 2.10c, mill. There continues some second quarter contracting by consumers with eastern mills at 1.60c to 1.65c, Pittsburgh. The Norfolk & Western railroad is figuring on a round tonnage of car material for the construction of 2,000 or more cars in its own shops. The Pennsylvania railroad will, in all prob-

ability, construct at Altoona some of the large blocks of cars recently inquired for.

We quote delivered to consumers' plants in Philadelphia and vicinity: Sheared steel plates on contract, 1.60c to 1.75c; universal plates on contract, 1.60c to 1.80c; sheared plates for early delivery, 1.75c to 1.85c; universal plates for early delivery 1.80c to 1.85c. Plates from store are quoted at 2.15c to 2.25c, delivered.

Structural Shapes. — Deliveries in shapes from some eastern Pennsylvania mills have eased up and one maker is now able to furnish tonnages of standard sections in six weeks. Other eastern makers, however, still are not promising under 10 to 12 weeks. Some eastern mills will accept 1.50c, Pittsburgh, or 1.65c, Philadelphia, on contracts, but others hold for 1.62c, Pittsburgh. There is not much contracting at present. Pittsburgh mills usually want 1.50c, Pittsburgh, for third and fourth quarters, but in some cases 1.45c is being done. Shape mills in the east are getting liberal specifications and are running full. Bids for the Balbao-Cristobal transmission line, Panama, requiring about 22,000 tons, which were to have gone in the past week, have been deferred until Feb. 15, at the request of prospective bidders. One buyer in this district is inquiring for 500 tons of shapes and a considerably larger quantity of plates for gasholder construction. Structural awards for buildings are few.

We quote for delivery to consumers' plants in Philadelphia and vicinity: Structural shapes on contract 1.65c to 1.75c; for early delivery 1.80c to 2.00c; from warehouse stocks, 2.15c to 2.25c.

Semi-Finished Steel.—The Pennsylvania Steel Co. in January produced at its Steelton, Pa., plant the heaviest ingot tonnage of any month in the history of the works. The use of the duplex method is largely instrumental for the record output. Several eastern consumers of steel have shown that they have underestimated their requirements and they have been beseeching the mills to anticipate contracts by a month or to enter new commitments. Eastern steel works, however, find difficulty in accommodating these customers, as the surplus material is fully taken to about midyear. English buyers, this week, put out some new inquiry for steel before eastern Pennsylvania makers.

We quote delivered to consumers' plants in Philadelphia and vicinity 4 x 4-inch open-hearth and Bessemer rolling billets at $29 to $31 and forging billets at from $36 to $40.

Sheets.—Some buyers have been closing contracts for second quarter with eastern makers at 1.90c, Pittsburgh, or 2.05c, Philadelphia, and now and then a consumer is expressing a desire to cover for the third quarter. The greater indifference of the plate mills for business in the lighter gages is directing a considerable tonnage in the heavier gages of sheets to eastern makers for riveted pipe construction, etc. The eastern market, which has been a little quieter, showed renewed activity in the past week.

We quote for delivery to consumers' plants in Philadelphia and vicinity, No. 10 gage blue annealed sheets at from 1.95c to 2.10c.

Coke.—Makers of furnace coke seem to have more or less spot material seeking a buyer, for they have been actively soliciting those eastern consumers who have not contracted, but are buying from week to week. One eastern furnace interest bought a small lot of Connellsville spot coke at $3.25, ovens, and later was offered material at $3. Contract coke also continues to decline, offers of Connellsville good quality fuel having been made in the east this week as low as $2.75, ovens, for first half. There is a belief among careful buyers that contract coke is headed for a $2.50, ovens, level.

Old Material.—An interesting development in the eastern scrap market is the reappearance of the Bethlehem Steel Co. as a large buyer of heavy melting steel. This buyer has been independent of the scrap market for some months because of its following the duplex steel method. Some reports persist of $13.50, delivered, having been done on heavy melting steel sold under pressure, but the general level of the market seems about $14, delivered. There is some demand for turnings and borings at prices which are 25 to 50 cents weaker. Offers are being made by buyers of $16, delivered, for No. 1 railroad wrought, and of $18.50, delivered, for iron rails. Low phosphorus scrap has weakened $1 to $1.50 a ton. Crop ends have dropped to about $18, delivered, and it is reported some sales of plate shearings have been done at $17.50, delivered.

We quote gross tons delivered to consumers' plants in eastern Pennsylvania and western New Jersey, as follows:

Old iron rails	$18.00 to 18.50
Old steel rails (rerolling)	16.50 to 17.00
No. 1 heavy melting steel	13.75 to 14.00
Old car wheels	16.50 to 17.00
Old iron axles	27.00 to 28.00
Old steel axles	20.50 to 21.50
No. 1 railroad wrought	16.00 to 16.50
Wrought pipe	13.00 to 13.50
Cast borings	10.50 to 11.00
Machine shop turnings	11.00 to 11.50
Heavy cast (broken)	15.00 to 15.50
Malleable	13.50 to 14.00
Stove plate	10.75 to 11.25
No. 1 forge	13.00 to 13.50
Low phosphorus	17.50 to 18.00

Freight rates per ton on scrap from Philadelphia to principal eastern consuming points are: $0.60 to Ivy Rock, Pa.; $0.65 to Phoenixville, Pa.; $0.80 to Coatesville, Pa.; $0.85 to Bethlehem, Pa., Reading, Pa., and Roebling, N. J.; $1.10 to Pottsville, Pa., Lebanon, Pa., and Columbia, Pa.; $1.20 to Harrisburg and Steelton, Pa.; $1.40 to Milton, Pa.

ST. LOUIS

Pig Iron Sales Confined to Small Lots

Office of THE IRON TRADE REVIEW,
St. Louis, Feb. 4.

Pig Iron.—Transactions in pig iron were at a low ebb in the St. Louis territory last week, and about the only thing of interest in sight today is the inquiry for 2,000 tons of car wheel pig iron, which has been on the market more than a week. Sales have been confined to small lots for prompt shipment, with no change in quotations. Prices on southern iron delivered, to whch the Birmingham freight of $3.75 has been added, are as follows:

Southern No. 1	$17.25 to 18.25
Southern No. 2	17.00 to 17.75
Southern No. 3	16.50 to 17.25
Southern No. 4	16.00 to 16.75

Old Material.—Conditions are unchanged in the scrap iron situation. The inclement weather is preventing the railroads from gathering their scrap. The mills say they have plenty on nand, buying has been light, and prices tend downward. Dealers, however, believe there will be considerable improvement within the near future. The Missouri Pacific closed a list today for 1,500 tons, and the Frisco one for 800 tons.

Prices which dealers are willing to pay, f. o. b. St. Louis, follow:

Gross Tons

Old car wheels	$15.00 to 15.50
Old iron rails	14.50 to 15.00
Rerol'g rails (5 ft. and over)	15.50 to 16.00
Old st'l rails (3 ft. and under)	14.00 to 14.50
Light section relayers (45 lbs. and under) subject to inspec.	24.00 to 25.00
Relay'g rails, subject to inspec	24.00 to 25.00
Frogs, switches and guards	13.50 to 14.00
Heavy melting steel	13.50 to 14.00
Shoveling steel	11.75 to 12.00

Net Tons

No. 1 railroad wrought	$12.50 to 13.00
No 2 railroad wrought	12.00 to 12.50
Arch bars and transoms	$15.00 to 15.50
Knuckles, couplers, springs	11.50 to 12.00
Shafting	15.00 to 15.50
Iron car axles	22.00 to 22.50
Steel car axles	18.50 to 19.00
Locomotive tires	12.50 to 13.00
Pipe and flues	7.50 to 8.00
Tank iron and cut boilers	7.50 to 8.00
No. 1 cut busheling	10.50 to 11.00
No. 2 cut busheling	8.50 to 9.00
Cast and mixed borings	7.25 to 7.75
Machine shop turnings	8.75 to 9.25
R. R. malleable	11.50 to 12.00
Agricultural, malleable	10.00 to 10.50
Stove plates	9.00 to 9.25
Angle splice bars (iron)	13.50 to 14.00
Angle splice bars (steel)	12.50 to 12.75

NEW YORK

Pig Iron Dull---Active Buying by Railroads

Office of THE IRON TRADE REVIEW,
1115 West Street Bldg., Feb. 4.

Iron Ore.—Inability to get full vessel tonnage is forcing Cuban ore operators to absorb some of the stocks which they had accumulated in furnace yards. The leading Cuban miner brought in during January about 85,000 tons, which was considerably less than the amount specified. The eastern ore market remains quiet. Labor conditions in the Port Henry district show continuous improvement.

Pig Iron.—Another week of extreme dullness has ruled in pig iron in the New York and surrounding districts. Sales have been limited with most makers to an aggregate of but a few hundred tons and under such a light demand it is difficult to state with accuracy the true price position of the market. All evidence continues to show, however, a softer condition of prices and northern No. 2X at tidewater today is quotable at from $18 to $18.25. Buyers are more freely able to induce producers to shade their former schedules 25 to 50 cents, but whether such a condition would continue in a market of more than meager activity, is problematical. Consumptive conditions show general soundness, as the foundries in this district are melting heavily. In some cases, their earlier estimates of requirements will be exceeded and supplemental buying necessitated. Such an underlying situation leads to a confidence among many sellers that considerable buying is in sight.

A Massachusetts machinery builder has purchased 3,000 tons of high phosphorus iron for the next several months' shipment, which is reported to have gone to an eastern Pennsylvania maker and is inquiring for 3,000 tons of high sulphur No. 2X for second quarter. New England buyers are able to obtain No. 2X at $18.90, delivered, or $17.00, eastern Pennsylvania furnace. Recent buying activity in the Buffalo district has considerably subsided. Virginia makers will now accept $15.50, furnace, for No. 2X, or $18.30, New York, for delivery during the first, second and third quarters. A Tennessee furnace interest, which recently withdrew its schedule of $15.50, Birmingham, for No. 2, has been quoting in the east on a practically $14.00, Birmingham basis. We quote:

Northern foundry No. 1	$18.25 to 18.50
Northern No. 2X foundry	18.00 to 18.25
Northern No. 2 plain	17.75 to 18.00
No. 2 Virginia	18.30 to 18.55
No. 2 southern foundry	18.50 to 18.75
Malleable	19.50 to 20.00
Gray forge	17.25 to 17.50

Ferro-Alloys.—Resale lots of prompt ferro-manganese have been sold recently at $64.00, seaboard, or $1 a ton under the level which makers generally are asking for both prompt and forward shipment. Some small selling for February delivery is noted at the $64 price. Inquiry in the market is very light at present in ferro-manganese and other alloys.

We quote standard English 80 per cent ferro-manganese at $64 to $65, seaboard, for early and for first half shipment and $65 for second half; 50 per cent ferro-silicon on contract at $75, Pittsburgh or Philadelphia, for carloads, $74, for larger lots, and $73, for 600 tons or more.

Plates.—Active buying of equipment by the railroads continues. The Norfolk & Western has placed 1,000 hoppers and 250 flats with the American Car & Foundry Co. and 1,000 hoppers with the Pressed Steel Car Co. The Louisville & Nashville has awarded 500 gondolas to the Mount Vernon Car Mfg. Co. The Bettendorf Axle Co., it is generally understood, will receive about 5,000 steel underframes and in addition will build 800 work and 500 flat cars of the large Harriman order. Full details of the full distribution of this order, however, is not yet made public. Bids are going in this week on the 12,300 cars for the Pennsylvania railroad. New business with eastern plate mills is being well maintained and deliveries are not shortening. Some contracting to the end of the second quarter continues to be done at 1.60c and 1.65c, Pittsburgh, or 1.76c and 1.81c, New York. On very early delivery high premiums are not infrequently obtained.

We quote, delivered at New York tidewater, for first quarter, 1.76c to 1.86c, New York, on sheared plates. Some makers are asking $1 higher for universal plates. On third quarter and last half contracts, Pittsburgh district, makers are quoting 1.61c to 1.66c, New York.

Structural Material.—Deliveries with some eastern shape mills have eased up and now range from 6 to 10 weeks. The contract market on shapes is usually at 1.50c, Pittsburgh, but for early and time to time needs, eastern makers are still obtaining 1.60c, Pittsburgh, or 1.76c, New York. The Pennsylvania Steel Co., it is understood, will furnish and erect the 12,000 tons of material for the Queens elevated railroad extensions, bids for which were taken last week. Post & McCord are reported as the successful steel contractors for the Loose-Wiles bakery, Brooklyn, which signifies that the American Bridge Co. will fabricate the 6,000 tons required. The Hay Foundry & Iron Works has 700 tons for the Hasco Building Co. apartment on Fifty-sixth street, and the Hedden Iron Works, about 700 tons for the Compagna Construction Co. apartment, West Seventy-second street. The American Bridge Co. has a supplemental order for 3,000 tons for the Western Union building, this city. Bids are again being taken on the revised plans for the Heywood Strasser & Voigt building, about 1,500 tons. Plans for the new Lord & Taylor store, uptown, 6,000 tons or more, will soon be out. Bids go in this week on another Queens elevated extension to require 24,000 to 25,000 tons.

We quote for New York delivery for first quarter as follows: Structural shapes, 1.66c to 1.76c. On third quarter and last half contracts, Pittsburgh district makers are quoting 1.61c to 1.66c New York.
Structural shapes from store, 2.15c.

Iron and Steel Bars.—New contracting for steel bars for third and fourth quarter shipment at 1.40c, Pittsburgh, is less active, as makers do not seem so desirous of pushing the far forward commitments. A good many consumers are already under contract for the last half. There continues a good demand for iron bars for early shipment at unchanged prices.

We quote for New York delivery, steel bars on contract from 1.56c to 1.61c, and common iron bars, 1.65c to 1.75c. Steel bars from store are quoted at 2.05c.

Semi-Finished Steel.—Eastern steel makers continue to receive inquiries for billets from Pittsburgh and other distant consumers and the scarcity in crude steel seems to have little modified. A Buffalo mill, which has been selling open-hearth billets freely, is now practically sold up for the

first half. Its capacity for that period is 50,000 to 60,000 tons. The American Car & Foundry Co., which has been inquiring for a round tonnage of plates for Detroit, is understood to have placed this business. An eastern saw manufacturer is inquiring for 3,000 tons for first half. Open-hearth billets are firm at $28, makers' mills.

Cast Iron Pipe.—The eastern cast iron pipe market shows irregularity in new demand, one week being active and the next slack in business offered. Public lettings are a little more numerous. Beverly, Mass., closes Feb. 11 on 750 tons, and Worcester, Mass., Feb. 18 on 2,600 tons. Boston is in the market for about 600 tons of special high pressure castings. Ramsey, N. J., is taking bids this week on 950 tons.

We quote six-inch pipe at from $24 to $26, f. o. b. New York, in carload lots

Old Material.—The market is full of material and the demand is only moderate, so that prices continue soft. Cast scrap is coming out very plentifully and is heavy. The sale of a small tonnage of heavy steel at $14, delivered, eastern Pennsylvania, was made this week and this figure represents the full market at present. Consumers of No. 1 railroad wrought will pay $16, delivered, for this grade. We quote gross tons prices New York dealers will pay at tidewater, as follows:

Old car wheels	$13.50 to 13.75
Old iron axles	22.00 to 22.50
Steel axles	15.00 to 15.50
Old steel shafting	14.50 to 15.00
No. 1 heavy melting steel	11.50 to 11.75
No. 1 R. R. wrought	14.00 to 14.25
Wrought pipe (not galvanized)	11.00 to 11.25
Cast borings	8.00 to 8.50
Machine shop turnings	8.50 to 9.00
Heavy cast	11.75 to 12.00
Stove plate	9.00 to 9.25
Grate bars	8.00 to 8.25

Freight rates on scrap per ton to Steelton, Pa., Columbia, Pa., Pottsville, Pa., and Harrisburg, Pa., are $1.50 from Jersey City, and $2.00 from New York; to Coatesville, Pa., Ivy Rock, Pa., Phoenixville, Pa., and Reading, Pa., $1.50 from Jersey City, and $1.80 from New York; to Bethlehem, Pa., $1.10 from Jersey City, and $1.60 from New York; to Roebling, N. J., $1.00 from Jersey City, and $1.50 from New York; to Milton, Pa., $1.60 from Jersey City, and $2.00 from New York; to Jersey City, $1.00 from New York; to Newark, $1.10 from New York.

BUFFALO

Pig Iron Market Very Quiet

Office of THE IRON TRADE REVIEW,
Buffalo, Feb. 4.

Pig Iron. — The market continues dormant, characteristic with the season of the year in this district, as January and the first half of February is usually the most inactive part of the year. Fundamental conditions seem sound, but the absence of buying has caused prices to soften. Lack of momentum makes it difficult to approximate the range of prices. The buyers are lagging to the limit on their supplies of iron, discounting delivery difficulties and furnace conditions to the point, in some instances, of getting down to a few tons. In the face of this situation specifications continue to come in, accompanied by urgent demands upon the producers, by wire, by phone, by letter, calling for immediate and certain nearby deliveries. Shipments into Canada have been retarded by reason of the traffic congestion on the Grand Trunk and the Canadian Pacific lines, which lack the motive power to handle the terrific tonnages of all forms of freight going across the border.

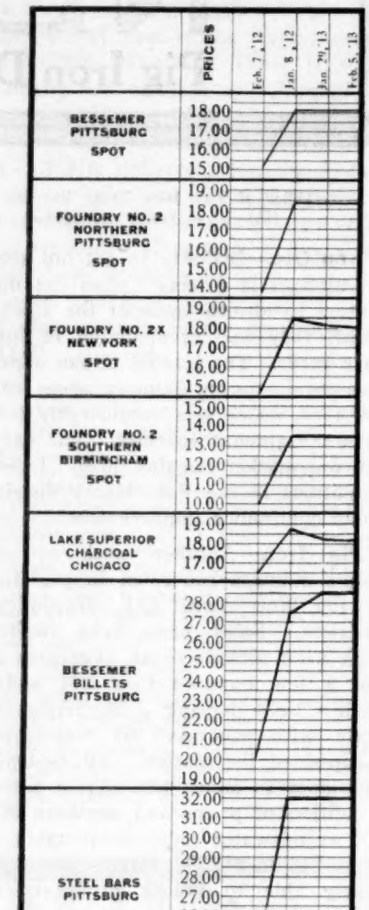
In some instances foundries have been able to place orders at concession prices, and to gage the market the range has been set between a $17.75 maximum on No. 1X foundry and $16.50 as a minimum on gray forge iron. Certain interests are maintaining a firmer schedule, but the following, f. o. b. Buffalo, approximates the market:

No. 1X foundry	$17.25 to 17.75
No. 2X foundry	17.00 to 17.50
No. 2 plain	17.00 to 17.50
No. 3 foundry	16.75 to 17.25
Gray forge	16.50 to 17.00
Malleable	17.25 to 17.75
Basic	18.00 to 18.25
*Charcoal	18.50 to 19.00
*Some grades	21.75

Old Material.—Varying degrees of activity, or the absence of it has caused advances in some lines and declines in others. Taken as a whole the market for the week has been a dull one. Local consumers have taken on considerable material, but this purchasing caused offers to be made to such an extent that it weakened prices in a number of the lines as shown below. Weather conditions have also favored the dealers and the roads in getting stocks out of the yards and in making deliveries. The range for the week, on gross tons, f. o. b. Buffalo, is substantially as follows:

Heavy melting steel	$14.25 to 14.75
No. 1 railroad wrought scrap	14.00 to 14.50
No. 1 R. R. and mch. cast sc'p.	13.75 to 14.25
Old steel axles	17.00 to 17.50
Iron axles	24.00 to 24.50
Car wheels	16.50 to 17.00
Railroad malleable scrap	13.25 to 13.75
Wr'ght iron and soft steel turn.	8.25 to 8.50
Cast iron borings	8.75 to 9.00
Low phosphorus steel scrap	17.00 to 17.50
Old iron rails	15.00 to 15.50
Tank iron	10.00 to 10.50
Boiler plate, sheared	15.50 to 16.00
Pipe and tank	10.00 to 10.50
Stove plate (net ton)	9.75 to 10.00
Sheet iron	7.75 to 8.25
Locomotive grate bars	11.00 to 11.50

PRICE CHART



BIRMINGHAM

Round Tonnage of Pig Sold for Export

Prince's Chambers, Corporation St., Birmingham, Eng., Jan. 25.

Pig Iron. — The feature of the week in the local market was the sale of a round tonnage of foundry grades, actually on hand, for export. Neither the price consideration in this sale, nor the exact tonnage involved, is made public in detail, but as a result of the transaction, the market is considered decidedly stronger in a certain direction. Aside from this just referred to, the trading in the week involved a smaller aggregate than was involved in the week previous. Carloads and lots of 100 to 250 tons each were the largest requirements offered, with prompt delivery specified in the majority of cases. For this, the prices received range from $13.75 to $14.25 per ton at Birmingham for No. 2 foundry, although one lot of especially low sulphur No. 2 soft sold at $15 per ton, Birmingham, and a lot of special No. 2 foundry brought $14.50 per ton at Birmingham. Practically no interest in forward deliveries was manifested in the week. Shipping instructions were probably not so heavy as for the week previous, but such a condition was, no doubt, due to the approach of the end of the month. The actual melt has not decreased, and so far as is known, no additional tonnage is being offered for re-sale. This last, in certain grades, is still understood to be available at prices around $13.50 per ton for No. 2 foundry. Furnace quotations have not been revised, but are considered nominal on a basis of $14 at Birmingham for the first half. The January production will probably show a substantial increase over any record in the past two years. During the first half of the month, seven stacks were operated on basic, with 17 stacks on foundry, compared with eight stacks on basic and 16 stacks on foundry in the last half. The addition of two additional furnaces to present operations is still being contemplated, but the grades produced by such additions will depend largely upon developments in the foundry market within the next few weeks. Furnace stocks as of this date have not been compiled, but from reports in hand, it is quite certain that the movement has not equaled the make. The production of charcoal iron is still represented by two active stacks, and the accumulation of that grade was reduced during January.

With the market very quiet, and all parties concerned awaiting developments with interest, nominal quotations are as below, per gross ton, f. o. b. cars here, for delivery in the first half, viz.:

No. 1 foundry	$14.00 to 14.50
No. 2 foundry	13.50 to 14.00
No. 3 foundry	13.00 to 13.50
No. 4 foundry	12.50 to 13.00
Gray forge	12.00 to 12.50
Mottled	11.50 to 12.00
Standard basic	14.00 to 14.50
Off basic	11.00 to 11.50
Charcoal	25.00 to 25.60

Cast Iron Pipe. — A contract for some 3,500 tons of water pipe has just been placed for the requirement at Seattle, Wash., but the price consideration is not given out. The volume of small orders being considered is very attractive, but owing to the unsettled condition of the pig iron market, purchasers are disposed to follow a very conservative course. For the present, quotations are unchanged, and are as follows, for water pipe, per net ton, f. o. b. cars here, viz.: 4-inch, $24.50; 6-inch and up, $22.50, with $1 per ton extra for gas pipe.

Old Material.—Recent transactions in this market have involved actual requirements only, and the schedule of prices has been fully maintained. Forward deliveries are probably weaker, but in the absence of trading, quotations cannot be revised. At present, dealers are principally interested in re-laying rails, No. 1 machinery, and melting steel scrap, with but little of any grades being added to stocks. The schedule below is quoted as representing prices being asked for the several holdings, all of which are per gross ton, f. o. b. cars at Birmingham:

Old iron axles (light)	$15.50 to 16.00
Old steel axles (light)	15.50 to 16.00
Old iron rails	15.50 to 16.00
No. 1 R. R. wrought	13.00 to 13.50
No. 2 R. R. wrought	11.50 to 12.00
No. 1 country wrought	10.00 to 10.50
No. 2 country wrought	9.00 to 9.50
No. 1 machinery cast	11.50 to 12.00
No. 1 steel scrap	11.00 to 11.50
Tram car wheels	11.00 to 11.50
Standard car wheels	13.00 to 13.50
Light cast and stove plate	10.00 to 10.50

METAL MARKETS

Foreign Tin Market Bearish

New York

Feb. 4.

Copper.—A renewal of caution on the part of both domestic and foreign consumers has been conspicuously felt in the market the past week. Sellers have made reductions of ⅛c as an inducement to create business, but have not succeeded in increasing sales. In fact as compared with last week the total of business since Jan. 27 is less. Electrolytic copper is offered today at 16.12½c for February and at 15.87½c for March and April, deliveries by brokers. While the leading selling agencies continue to quote 16.50c, delivered, 30 days, for that grade it is generally believed that concessions have been made to secure desirable orders. Lake is obtainable at 16.25c and casting at 15.75c.

Tin.—Sales aggregating 335 tons of tin were made on the New York Metal Exchange today. All positions from February to August inclusive, were traded in. With the exception of the transaction in February the business was done at the equivalent of about £2 under today's London price of futures. One lot of 25 tons of February sold at 49.25c; 10 tons of June at 48.25c, and 50 tons each of March, April, May, June, July and August at 48c. Somewhat of this bearish sentiment respecting the value of future tin has prevailed in the London market for several days, and local explanations of it connect it with the threatened labor troubles at American consuming plants. The outside market has been rather dull. Spot and February closed today at 49.25c.

Arrivals of tin since Feb. 1, aggregate 750 tons and there are 3,535 tons afloat.

Lead.—The lead market has been quiet and steady at from 4.30c to 4.35c in New York.

Spelter.—Pressure to sell spelter has forced the market to 6.70c in New York, and there is very little interest shown by consumers.

Chicago

New Metals.—Both copper and spelter are still weak as compared with prices current a week ago, but nevertheless there appears to be a fair amount of activity in the market.

We quote dealers' selling prices f. o. b. Chicago as follows:

Lake copper, carload lots, 16⅜c, casting, 16c; smaller lots, ¼c to ¾c higher. Spelter, car lots, 6.85c; lead, desilvered, 4.30; sheet zinc, 9c, f. o. b. Lasalle, in car lots of 600-pound casks; pig tin, 50.12c. Cookson's antimony, 9⅞c; other grades, 9c.

ORE LANDS

In Wisconsin Said to Have Great Possibilities.

During the past few days some remarkable news stories have been published about what some of the newspapers have described as "what may be the greatest iron ore discovery in the world's history". The facts seem to be that M. M. Riley, former counsel for Corrigan, McKinney & Co., Cleveland, in the upper peninsula of Michigan, is acting as trustee for the purchasers of leases of lands, involving a large tract in the southwestern part of Wisconsin, in Vernon county, and several of the adjoining counties. Mr. Riley is quoted by the *Milwaukee Sentinel* as saying:

"I have been over part of the territory with Capt. Grant S. Barber, superintendent of the Colby and Ironton mines at Bessemer, Mich., and all that can be possibly said at present is that the iron deposits are very widely distributed and worth investigating and exploring. Outcroppings show that there are evidently two deposits of hematite ores, between which is found another deposit in the form of limonite of iron."

Mr. Riley also said that the ores are non-Bessemer, running from 54 to 59.26 in iron. He adds that the territory has great possibilities and that if the ore deposits extend to any considerable depth, it means much to the state in the rapid development of that section. Mr. Riley says he is not representing Corrigan, McKinney & Co. in the handling of this property.

Coke Still Declining

Pittsburgh, Feb. 5. (By wire.)—It is understood that shippers of standard Connellsville coke are offering 48-hour fuel for $2.75 a ton, ovens, and rumors of offers of $2.65 are heard, although no trace of actual sales can be found. Consumers appear well provided for immediate needs and no contracting is being done. Foundry coke is selling at about $4, ovens, and several sales have been made at $3.75, according to statements made this morning.

Will Break Ground Next Spring

New York, Feb. 5. (By wire.)—It is announced officially that the Steel Corporation will break ground next spring on the construction of the new Canadian plant at Sandwich, Ont. Plans, now being perfected, call for the construction of the entire works, to go forward at one time.

Seriously Damaged.—The forge department of the Erie Forge Co., Erie, Pa., was seriously damaged by fire on Feb. 2, the loss being estimated at $100,000. The loss is fully covered by insurance. The company advises that it will proceed at once to rebuild.

FOUNDRY CONVENTION

Will be Held in Chicago, Oct. 10-17—Exhibits at Amphitheater.

Chicago, Feb. 4.—Definite arrangements have been concluded by committees representing the American Foundrymen's Association, the American Institute of Metals and the Foundry & Machine Exhibition Co. to hold the annual foundry convention in Chicago between Oct. 10 and 17. The Foundry & Machine Exhibition Co. has arranged to hold the exhibits at the International Amphitheater, Forty - second and Halsted streets. This pavilion has a number of desirable features, being easily accessible from all parts of the city and larger than any of the previous exhibition halls. Also there will be unusual facilities for the installation of working exhibits.

H. S. Vrooman, Fisher building, Chicago, recently tendered his resignation as a director of the Chicago Foundrymen's Club, and H. Cole Estep, associate editor of THE IRON TRADE REVIEW, has been elected to fill the vacancy.

Strike Collapses

Fear that the strike at the Rankin and Braddock plants of the American Steel & Wire Co. might spread to other mills in the Pittsburgh district was abandoned Monday when about 80 per cent of the men reported for work. Strikers doing picket duty joined the squads of men as they entered the gates. Although all of the employes have not returned to work, both plants are operating practically at capacity, and it appears as if the strike, featured by a couple of riots and the death of an innocent bystander, has become a thing of the past. Out of town officials of the American Federation of Labor left the scene of the trouble early in the week.

Death of L. R. Root

Chicago, Feb. 4.—Lucius R. Root, vice president of the Amalgamated Roofing Co., Chicago, died at West Baden, Ind., Feb. 1.

H. T. Clarke, of Omaha, president of the Missouri River Improvement Association, died at Excelsior Springs Feb. 3. Mr. Clarke was a bridge contractor and was 78 years old.

MAKING SOUND INGOTS

Will be Discussed at a Meeting of Institute of Mining Engineers.

The American Institute of Mining Engineers on Feb. 18 to 21, will hold a meeting in New York on the subject of making sound steel ingots. As a part of this meeting, on Feb. 19, new processes for making steel ingots will be described and a general discussion will be had upon this subject, based on the following divisions:

Is the present method of getting rid of the pipe by cropping, a safe and reliable device for making sound steel?

Is it desirable to increase the amount of metal arbitrarily cropped off the top of an ingot, and, if so, what would be a fair excess price to pay for cropping off 20 per cent?

Is it commercially practicable to make ingots without pipes or blow holes, and what additional expense of manufacture would be justified to accomplish this result?

What process for making pipeless ingots seems the most promising for commercial success, and why?

Cordial invitations are extended by the institute authorities to the leading iron and steel men of America in the hope that they will join their knowledge and experience with that of others in bringing these questions nearer a satisfactory conclusion. A large number of railroad construction engineers have been invited to be present and join in the debate. It is hoped that some of the prominent metallurgists of Europe will attend this meeting.

The following papers dealing with the subject of sound steel ingots will be presented: "The Production of Solid Steel Ingots," by Benjamin Talbot; "Piping and Segregation of Steel Ingots and Ductility Tests for Open-Hearth Steel Rails," by P. H. Dudley. "The Use of Anti-Piping Thermit in Casting Steel Ingots," by E. A. Beck.

Other papers on iron and steel topics that will be presented follow: "Valuation of Iron Mines," by J. R. Finlay; "Notes on Cast Iron," by Albert Sauveur; "New Design of Open-Hearth Furnace, Using Producer Gas," by H. F. Miller Jr.; "Why Does Lag Increase with the Temperature from Which Cooling Starts?" by Henry M. Howe; "Microstructure of Sintered Material," by B. G. Klugh; "Blast Furnace Slag Analyses for 24 Hours," by F. Louis Grammer; "Methods of Preparing Basic Open-Hearth Steel for Castings," by H. F. Hiller Jr.; "Comparative Notes on Steel Rail Rolling," by Robert W. Hunt.

THE ABC OF IRON AND STEEL

The Manufacture of Wrought Iron

By James P Roe[1]

SOMEWHERE in the western part of Asia, the hotbed of the human race, the iron industry was cradled by prehistoric man. The late Dr. Percy, the eminent metallurgist, says: "From suitable ore, of which abundant and readily accessible supplies exist in various localities, nothing more easy can be conceived than the extraction of malleable iron. Of all metallurgical processes it may be regarded as amongst the most simple. Thus, if a lump of red or brown hematite be heated for a few hours in a charcoal fire, well-surrounded by, or imbedded in, the fuel, it will be more or less completely reduced, so as to admit of being easily forged at a red heat into a bar of iron. The primitive method of extracting good malleable iron directly from the ore, which is still practiced in India and in Africa, requires a degree of skill very far inferior to that which is implied in the manufacture of bronze. The production of this alloy involves a knowledge of copper-smelting, of tin-smelting, and of the art of molding and casting. From metallurgical considerations, therefore, it is reasonable to suppose that the so-called "Age of Iron" would have preceded the "Age of Bronze." Archeologists, however, seem generally to have arrived at an opposite conclusion, mainly from the fact that, while ancient objects of iron are exceedingly rare, ancient objects of bronze are abundant. But it should be re-

The following articles of this series previously have been published in THE IRON TRADE REVIEW: "Iron Ore and Mining Operations," Jan. 5; "Beneficiating Iron Ores," Feb. 2; "Rules for Figuring Penalties and Premiums on Lake Superior Iron Ores," March 9; "Transportation of Iron Ore on the Great Lakes," March 16 and April 13; "Ore-Handling at Lower Lake Ports," Oct. 12, 1911; "The Manufacture of Bee-Hive Coke," Jan. 4, 1912; "Pig Iron and Its Method of Manufacture," Jan. 2, 1913.

[1]General superintendent, Glasgow Iron Co., Pottstown, Pa.

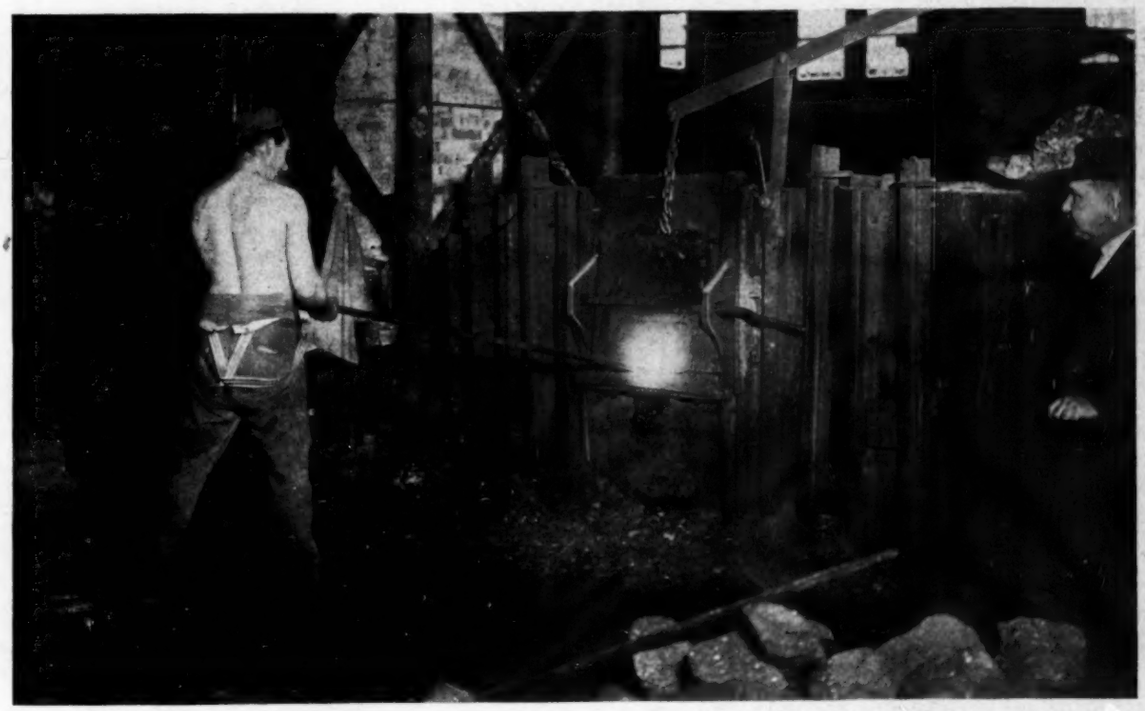


FIG. 1—A REPRESENTATIVE TYPE OF PUDDLING FURNACE, SHOWING THE METHOD OF OPERATION

membered that iron is very rapidly corroded by oxidation, even in dry climates, whereas bronze is very slowly acted upon even in moist climates. Hence, if objects of iron were ever so numerous in ancient times, it is certain that only few could have been long preserved, as the conditions necessary to protect the metal from oxidation must have been quite exceptional." This, the writer considers strong evidence that iron antedates bronze, and that the only metal objects preceding the reduction of iron ore, were native copper and meteoric iron.

It is fair to assume the first iron produced was the result of chance, when lumps of iron ore, in place of stones, formed a rude cooking fire, associated with some feast, where the fire was maintained long enough to effect the reduction. Further experience led to the knowledge that the higher temperature of the fire acquired when the wind was blowing, produced better material. This resulted in hearths being located on hill tops, where the wind had full play, and in valleys, where the topography confined and emphasized the currents of the wind. These were followed by wide-mouthed covered channels, on the windward side of eminences, leading up to the hearth, and narrowed as they approached it.

As the art developed, the unreliability of the wind became increasingly burdensome, and various devices for the artificial production of blast were introduced. The first of these appears to have been the goat skin, taken off the animal by opening the hinder end only, the legs sewn up, a nozzle inserted in the neck to connect to the tuyere or blast pipe, and the tail end cut transversely, so as to form a slit for the admission of air. Starting with one skin, giving intermittent delivery, the change to two skins was a natural advance to produce a more constant blast, the man then throwing his weight first on one and then on the other. This type is still in operation in parts of India, while in Europe the two goat skins developed into the two-part bellows of the country blacksmith of today. Verily, it breathes antiquity.

Wrought iron and steel with hardening properties, were produced at that time, and long after, as twins, and were separated by the appearance of the fracture for their respective uses.

During the age of iron's scarcity, it was considered a precious metal, while we, in its plenty of today, call it one of the baser metals; rarely thinking that we would feel its absence more than the loss of all the so-called precious metals, and all other metals combined. In the days of Edward III of England, during the early part of the fourteenth century, the iron pots and frying-pans of the royal household were classed among the jewels, and iron utensils, implements and arms were the most prized plunder of the

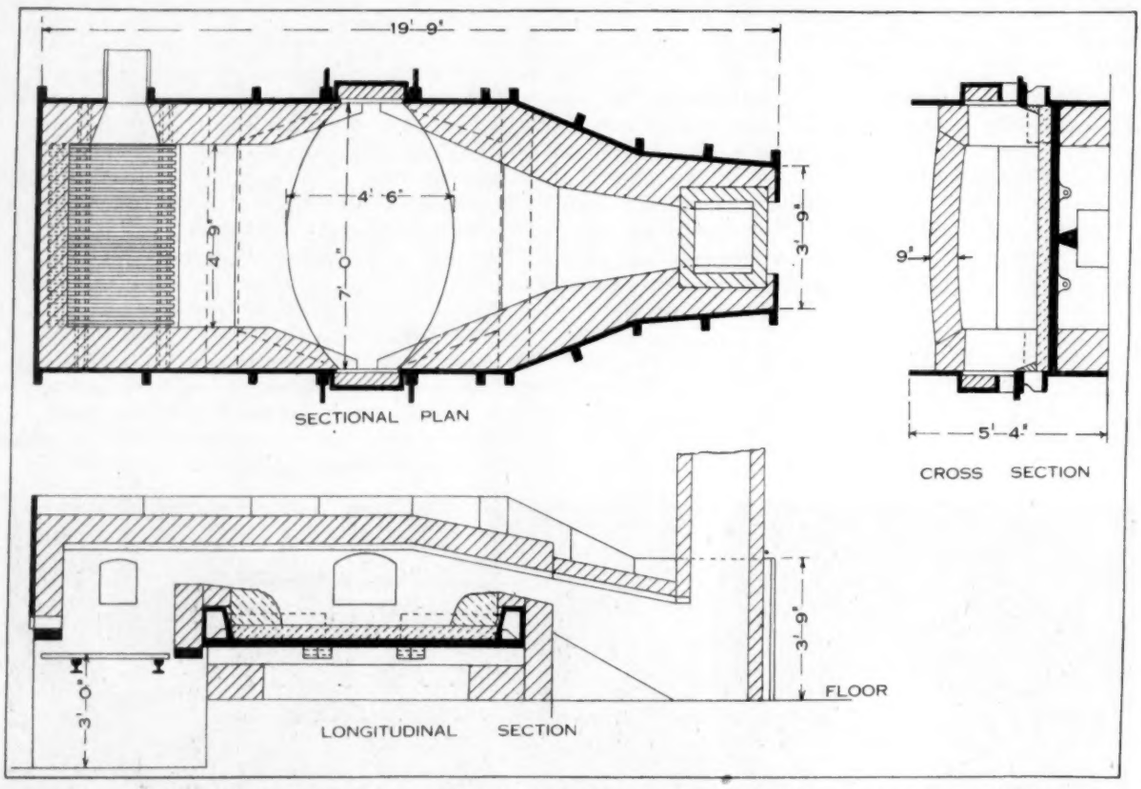


FIG. 2—PLAN, CROSS AND LONGITUDINAL SECTIONS OF A DROP NECK PUDDLING FURNACE

freebooter. It is iron in its various forms that differentiates the civilization of today from those of the past, by making possible our many labor-saving devices and efficient transportation. Iron gives power, liberty and leisure.

For centuries the changes in hearths and equipment were insignificant, but they finally developed into the Catalan forge of recent times. The Catalan forge was introduced into this country and chiefly used in some of the southern states. Its off-spring, the American bloomery, was used in various states, but most largely in the Champlain district, where the maximum output was reached in 1882. Charcoal always remained the fuel, as needs must be when iron and fuel are in contact. It should be stated that while vast economies have been effected in the consumption of ore and fuel in latter processes, no improvement has been made in the quality of wrought iron and high carbon steel, the old blades of Damascus, Toledo and Bilbao have never been excelled; and as the direct process died, the knell of the picturesque in iron making was sounded; the association of wooded hills and clear streams with iron-making was gone. Such in brief is the history of the production of wrought iron direct from the ore.

To retrace our steps, and follow the introduction of the indirect processes, we must go back to a period about the middle of the fourteenth century, when some antiquarians claim to have found evidences of cast iron having been made in England. This lacks confirmation, however, and we must turn to the continent to find the introduction. The German metallurgists, in their efforts to reduce the fuel consumption and the costs of manufacture, gradually increased the size of their furnaces, especially their height, until conditions favorable to the production of cast iron were reached. This resulted in a mixed product of wrought iron, steel and cast iron, which was a source of great annoyance to the smelters, until uses had been discovered for the cast iron, and experience had defined the lines along which they should work to make either product at will. This furnace, known as a stuckofen, was the original progenitor of the blast furnace, and, like all furnaces at that time and for centuries later, used charcoal for fuel. Most of the pig iron produced was *white*, that is, low in sulphur, due to the fuel used, and low in silicon, since the height of the furnace and crude blowing appliances in use prohibited the maintenance of high temperatures.

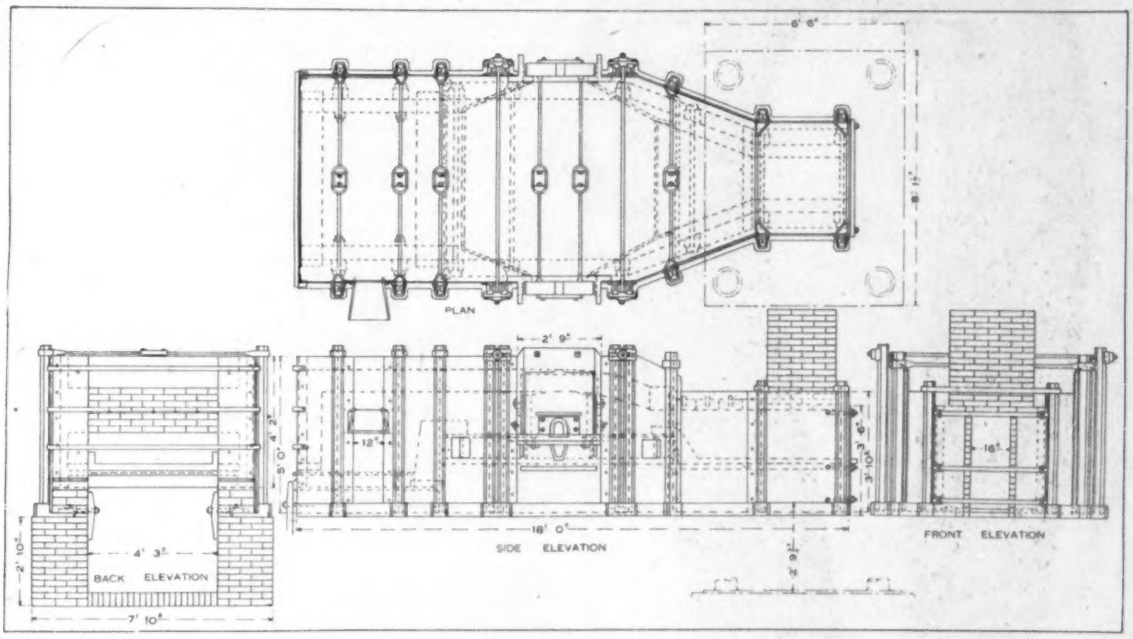


FIG. 3—PLAN, BACK, SIDE AND FRONT ELEVATION OF A STRAIGHT NECK PUDDLING FURNACE

While the use of this new product was first confined to castings, it is improbable that it was restricted to the one use for any considerable period, although there is no date defining just when cast iron was first converted into wrought iron. It is likely that some worker argued that the blast furnace—for such we should now call it—did not effect the whole of the process hitherto carried out in the open-hearth, and that the latter was required to complete the refining. Thus we see the dawn of the indirect production of wrought iron, effected in the crude hearths of that day, hearths similar to those used for the direct process.

The industry had again been highly stimulated in England, when, during the first

year of Elizabeth's reign in 1557, an act was passed prohibiting the cutting of wood in many districts for iron-making, since the destruction of the forests excited alarm on account of the scarcity of wood for naval purposes. Another act was passed 27 years later still further restricting its use. These laws checked iron-making; but, although a serious hardship at the time, this proved an ultimate advantage, since it compelled those interested to turn their minds towards bituminous, or sea coal, as it was then called. This material had certainly been used as early as 853 for ordinary purposes, but its

FIG. 4—FRACTURE OF WROUGHT IRON PARALLEL TO THE FIBER

high sulphur contents precluded its use in the hearth of a furnace, in direct contact with the iron. Now necessity prompted greater efforts, the first result of which was a patent in 1611 to one Simon Sturtevant, who failed. Next, in 1620, Dud Dudley secured a patent for the use of sea coal; but, while success was claimed for this invention, the results are obscure.

A considerable period now appears to have elapsed before any further attempt was made to smelt iron with sea coal, and it was reserved for Abraham Darby to solve the problem with complete success, about the year 1735. Darby's first effort, like those of his predecessors, was with raw coal in the blast furnace. Failing in this, he next tried burning the coal in heaps on the ground, just as wood was burned to make charcoal. The use of the resultant coke, led to pronounced success in the blast furnace.

As has been stated, the iron made in the charcoal blast furnace was low in silicon and sulphur. The iron made with coke was naturally higher in sulphur, to reduce which the temperature in the blast furnace was increased, with a resulting higher silicon. This first led to the desiliconizing of the iron in one operation, and then changing the cinder, and completing the refining as a second operation in the same hearth. Later, the two operations were effected in different hearths; a method known as the South Wales process.

The apparatus for this process consisted of a melting hearth, called a refinery, or running-out fire, and two finery hearths. The pig iron was melted under coke by means of blast in the run-out hearth, and here the silicon and manganese were oxidized, the operation being synchronized with the two finery hearths into which the molten metal alternately flowed and where it was completed. Charcoal was used in the finery hearths, which were identical with those used when working charcoal pig.

As a natural sequence to the successful use of coke in the blast furnace, the metallurgists of those days sought means by which to use either coke or raw coal for the conversion of cast iron into wrought iron. To use coal successfully it was essential to avoid contact between the iron and the fuel. This led to the introduction of the reverberatory furnace, for which the first patent was issued in 1776 to Thomas and George Cranage. The measure of success they attained can only be judged by subsequent development, on which history is silent. The same fate was experienced by Peter Onions, who obtained a patent in 1783. To none can be given the credit of invention, since invention implies the carrying of ideas into effective practice.

In 1784 Henry Cort patented the following process: "For the preparing, manufacturing, and working of iron from the ore, as well as from sow and pig metal, and also from every other sort of cast iron, I make use of a reverberatory or air furnace, the bottoms of which are laid hollow or dished out, so as to contain the metal when in a fluid state." This he worked to a successful issue; therefore, to him belongs the credit for first using coal for refining iron, and for introducing what was later known as the puddling process, which was destined to be of such enormous benefit to the world at large. The

bottoms were solid and were made of sand, which caused slow working and made it essential to use iron low in silicon. When first introduced the iron loss was excessive, taking two tons of pig iron to make one ton of bars; and for some years after the process was well-known, the loss was from 50 to 70 per cent. Such an iron loss would have been intolerable, exceeding as it did that in any of the older methods, had it not been for the fact that this process made available a cheap and abundant fuel. Thus the valuable features of Cort's invention were that it contained an embryo of great vitality that admitted of development, and made possible the use of coal in a country where the supply of wood was limited. The demand for iron at any price was much accentuated by the political unrest of Europe at that time, followed by the Napoleonic wars, which proved destructive to industry on the continent, and tended to concentrate the iron industry in England, with resulting rapid development in Cort's process.

The original process was improved by the use of air-cooled, cast iron bottoms, although a superimposed working bottom of sand was still retained, while the use of run-out metal made higher silicon iron available. The principal difficulty with the process was caused by the absence of the proper cinder, to overcome which various fluxes or physics were tried, none of which were of any real value. The process was subsequently known as *dry puddling* after the introduction of *pig boiling*.

The pig boiling process was invented by Joseph Hall about 1830, and from the time of its introduction to the present it has been the chief producer of wrought iron, and today is known under the broad term of puddling.

The only changes made in the reverberatory furnace for puddling have been those of increasing the size and working from both sides, when it is called a double puddling furnace. Therefore, a brief description of modern construction will suffice for the whole period of development.

The furnace is a single, bedded reverberatory of simple construction, lined externally by plates bound together with rods, provided with a stoke-hole for firing and a working door midway of the hearth, and lined internally and roofed with fire brick. The bottom is composed of heavy, cast iron plates, which rest upon an iron frame to admit of the free circulation of air underneath. The working hearth, oblong in form, is surrounded by hollow cast iron chills, through which air generally circulates, although steam or water is sometimes used. Whatever the cooling medium, the objects sought for are to cool the working lining of the hearth and to prevent the fluid cinder from finding egress. The sides of the hearth are faced with oxide of iron, commonly iron ore, and the bottom is covered to a depth of 3 to 5 inches with practically pure oxide of iron, made by oxidizing wrought iron or steel scrap in the hearth. It was and is a simple, almost crude, furnace, limited in size by the capacity of a man to reach any part and exert effective force therein. As shown in Fig. 1, the attire of the puddler is beautiful in its simplicity and savors of the pre-historic. Details such as grate area, depth from top of fire bridge to grate bars, and height of flue, vary with the fuel and pig iron used and product desired, and are all largely controlled by the custom or habit of the men in any particular mill or district.

One advantage of the puddling process is its ability to deal with pig iron of *widely* differing composition. It is not, however, good practice to vary much in an individual

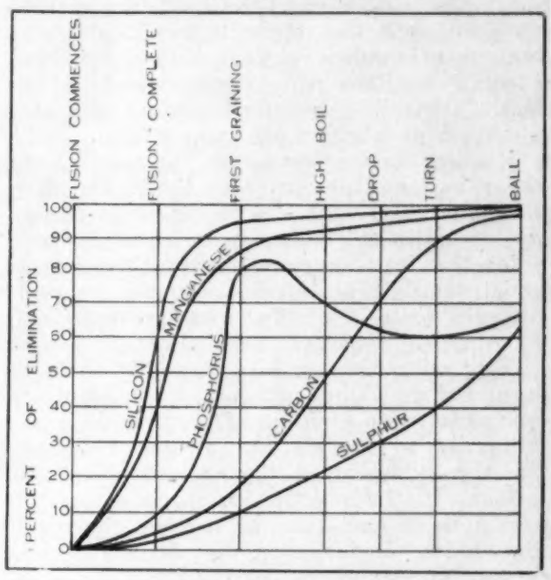


FIG. 5—SEQUENCE OF REACTION OF THE PUDDLING PROCESS

mill, since the habits of the majority of the men form a large part of their skill. This is not intended as a reflection on the puddlers, as it applies with equal force to any labor demanding skill. Indeed, in the writer's experience, a comparatively slight change in the relative contents of silicon and sulphur has proved most disastrous, until the puddlers could adjust their work to the changed conditions. Hence, for a uniform product, it is desirable to use a reasonablly constant character of pig iron. This was formerly accomplished by mixing brands, while today chemical analysis is the chief guide. Broadly, the same remarks apply to the fuel used, but, in all cases, it should be high in volatile matter. The particular fix or fettling used to form the sides of the hearth is largely determined by the material most

available in a given locality. It should be low in silica, and infusible at the temperature of the puddling furnace.

The process consists in removing from the pig iron, nearly all of its carbon, silicon and manganese, and most of its phosphorus and sulphur, by agitation in the presence of a suitable cinder and gases of the proper composition and temperature, and by crystallization, due to the greater infusibility of the iron as the metalloids are oxidized. The sequence of operations of the process is shown graphically in Fig. 5.

There is scarcely any metallurgical operation more interesting to watch than puddling, since most of the reactions and changes are apparent as they progress. It is also somewhat simple, in that the fix forms a reservoir of relatively pure oxide of iron, which is automatically drawn upon by the cinder of the bath for correction; that is, the higher the silica of the bath, the greater its draft upon the relatively basic sides and bottom to produce a final cinder, low and constant in its silica content, which is the factor controlling the final content of phosphorus from a given pig iron.

Practice varies somewhat radically as to the period and character of the oxide additions, but, since the object sought is closely analogous in all cases, it is better to consider the broad means, rather than immaterial details. The oxides charged are puddle mill scale or cinder, from the rolls and hammer or squeezer, consisting of ferrous silicate with more or less magnetic oxide of iron and finishing mill scale consisting of magnetic oxide of iron. Their functions are primarily to provide the oxygen necessary for the oxidation of the various metalloids present in the pig, to form a reservoir to retain them, and later to become the welding cinder. Incidentally, they lessen the loss in weight from pig iron to puddle bars. Since the removal of the silicon and carbon from the pig is due to the action of the oxide of iron, an equivalent amount of metallic iron is reduced and added to the bath. Part of this gain, however, is generally, and much of it unnecessarily, lost in the subsequent stages of the process, resulting in a net average loss of about 5 per cent. At all times, the condition of the oxygen in the cinder is controlled by the gases in the furnace, as affected by the condition of the fire and the position of the damper. The presence of ferrous oxide is vital to the later stages of the process, because a ferric oxide causes excessive waste of iron and forms a viscous cinder that prevents efficient welding. They are readily distinguished, since the ferrous oxide looks white, while the ferric appears red and are called *hot* and *cold*, respectively, by the puddler, even though the temperature is the same. For a given condition of oxidation in the cinder, the latter is the more fluid as the oxide of manganese, the silica and the temperature are increased.

The objects of the agitation, which are equally important as the cinder and is chiefly accomplished by the rabble (effectively assisted by the high-boil), are to produce as uniform conditions as possible throughout the bath; to break up the larger masses of iron that tend to form and to prevent, as far as possible, the settling of the iron in a partly refined condition on the relatively cold bottom. The more fluid the cinder, the more vigorous the agitation must be, and the finer will be the grain of the resulting iron.

The final cinder is a silicate of protoxide of iron and a little magnetic oxide. Its functions are those of protecting the iron against oxidation during balling and in its passage to the squeezer, and, in use, to offer an effective resistance to corrosion.

The grains of iron, as finally formed, vary in size from 1-32 to 1-16 inch in diameter, each being surrounded by cinder. These form small clusters of six or eight grains, which clusters, in turn, collect in grotesque forms, all loosely held together by the cinder, which, if taken from the furnace and cooled, can be parted readily between the thumb and finger.

The ball is drawn in the form of an alleged sphere, its interstices being filled with cinder; by squeezing, its shape is changed to that of a crude cylinder, about 6½ inches in diameter. The shape of the individual grain is altered but little, while most of the cinder is expelled, except that which is held by cohesion surrounding the individual grains. The cross-section of the squeezed bloom, about 33 square inches, is reduced by rolling to 3¾ square inches in a puddle bar 6 inches by ⅝ inch, that is, a ratio between original and finished size of 8.8 to 1. If the puddle bar be cut into lengths of 3½ feet, and a number of such bars put together to form a pile of the same width as the plate, or bar, is to be, and then rolled to a length of 70 feet (quite common practice) it will be 20 times the length of the puddle bar; 8.8 multiplied by 20 equals 176, which is the total increase in length from the squeezed bloom to the finished plate. As with the whole, so with any part; therefore, a grain 1/16 inch at the start, multiplied by 176 becomes a so-called fiber, 11 inches long. Its cross-section must have been reduced in an equivalent ratio, and since neither the width of the pile nor that of the grain have been changed, the whole of the reduction must have occurred in the thickness. One-sixteenth of an inch divided by 176 equals 0.00035 inch; thus forming a ribbon 11 inches long by 1-16 inch wide by 0.00035

inch thick, tapered, however, both in width and thickness towards the ends by the crowding of the contiguous fibers, which break joint, one with the other.

In perfectly welded finished products of iron made from puddle bar, the cinder content varies from ¾ to 1½ per cent; this being the cinder held by cohesion and enveloping each grain at the time of its formation and drawing. Taking the average at 1.2 per cent by weight, it would approximately equal 2 per cent by volume, making 1 per cent on each surface, which together with the same on the contiguous ribbon makes 2 per cent of the thickness of the iron for that of the cinder or about 0.000007 inch thick.

That this is not revealed by the microscope is in no way surprising, but that it is not so visible is no proof that it does not exist. Indeed the mind can more readily grasp the fact of its existence, than accept the only alternative; that is, that the last trace of semi-mobile matter such as hot cinder, is forced out from between two bodies of only slightly less mobility, such as grains of heated iron.

The most apparent evidence of the correctness of the foregoing statement can be obtained by taking a piece of iron, which has been rolled in the manner described, and breaking it by bending, with its fractured surfaces parallel to the direction of the fiber. Additional proof is seen in the relative absence to resistance to transverse rupture, either by bending as above, or by the pulling test. Were it not for the increased distance apart of the fibers, due to the interlaced cinder, there could be no greater difference between the transverse and longitudinal resistance to rupture on the part of wrought iron, than exists on the part of soft steel. The lessened transverse strength must, therefore, be imputed to the reduced molecular attraction of the fibers of iron, due to their separation by the much attenuated, interlacing cinder. Fig. 4 shows fracture parallel to the fiber, enlarged three times.

While the example given is that of a grain maintaining its initial width, the results are broadly the same when the puddle iron receives sidewise reductions; or where, as in wide plates, they receive transverse rolling. In the former, the finished fiber approximates the shape of a needle, in the latter that of a disc, and, as would naturally be anticipated, the disc structure increases the transverse strength, while lessening the longitudinal.

The same general procedure is followed in making all the various characters of product from puddle bar. The first step of this process is a mechanical one, that of forming the *pile*. Here the one requirement is the uniform distribution of the iron, to avoid possible spaces in which the cinder may be trapped, when by the sealing of the exterior of the pile it may fail to find egress and thereby cause laminations. Danger from this source is increased by size in a more rapid ratio than the direct increase in the mass of the pile. It is further emphasized when scrap, as is common, is interposed between the puddle bars forming the top and bottom of the pile. For the best results, it is important that the whole of the pile, and all the piles in a heat, be of the same character of iron; since varying compositions require different degrees of temperature for welding.

The next step, *heating,* is an association of temperature with the continuation of the reactions of the puddling furnace. The reactions are most marked in large piles, since the long period taken to acquire the necessary temperature for welding, which is considerably higher than in the puddling furnace, causes the reduction of some of the oxide in the puddle bars and the elimination of carbon. This reaction is most active in the less refined bars or portions of the bars. Upon the accession of a high temperature the oxidation of the surface of the iron is very rapid, producing a pure oxide of iron, which absorbs some of the phosphorus in the bars to a perceptible depth. As the welding heat in the furnace is approached, it is desirable to maintain as reducing an atmosphere as possible, to avoid excessive waste and especially the production of ferric oxide, since the latter prohibits efficient welding. It is readily recognized by its red and so-called *cold* appearance. This cinder should be as ferrous as possible, but at best it is only magnetic oxide; therefore, the cinder between the bars in a pile is not as good a welding cinder as that in the bars themselves. It should be said, that the best and purest iron welds efficiently, but demands a higher temperature than irons containing higher contents of cinder, phosphorus and sulphur.

The final step, having any metallurgical significance, rolling, has two vital features: That of preventing as far as possible the sealing of the ends and sides of the pile until the excess of liquid cinder has been expelled, since its presence causes laminations; and the amount of reduction in section from the puddle bar to the finished product; the greater the reduction the better the result. As bearing on this, it should be stated that while three-high and reversing mills have reduced the labor in making iron, the quality of the product can only be made equal to that of the old *shove-over* mill by increased intelligence and skill applied to the general procedure, since rolling in alternate directions tends rather to work any excess

cinder or foreign matter back and forth, instead of expelling it at one end.

Wrought iron, when properly made, consists of a series of units of fibrous formation in a matrix of ferrous silicate, the units being welded together with an intervening cinder of magnetic oxide. The latter is plainly visible under the microscope, and in part to the unaided eye, and is not infrequently mistaken for the fiber in the puddle bar. Not only are these two cinders of different chemical composition, but they have an opposite action on the iron. The silicate in the puddle bar resists corrosion, resistance being greater as the cinder content is increased, while the magnetic oxide, if unduly thick in the interior, or as surface scale, promotes corrosion.

Structure

The rope-like structure of wrought iron, breaks up the continuity of the mass, each fiber offering its individual resistance to longitudinal rupture, a feature fitting it peculiarly for dynamic strains. It may here be appropriate to quote the late Dr. Charles B. Dudley, than whom there has been no abler practical metallurgist.

[2]"Iron and steel do not behave alike, when subjected to bending stresses. We think it is perfectly safe to say that a well-made iron car axle, the metal of which will show in tensile strength from 48,000 to 52,000 pounds per square inch, will stand successfully the same fiber-stress as steel of 80,000 to 85,000 pounds tensile strength. Just why this is so, I am unable to explain, but there is a very large amount of accumulated experience which seems to indicate that a metal like iron, which is believed to be a bundle of fibers, each one surrounded by slag, and which has within itself the power of the distribution of the strain, is a more reliable metal when subjected to bending-stresses than a perfectly homogeneous metal like steel."

For obtaining good physical tests and efficient service, thorough welding is of vital importance; in its absence, both the ultimate tensile strength and the elongation are radically reduced. Imperfect welding manifests itself by blisters and laminations.

Blisters are caused by the presence of carbon, in some form, in conjunction with cinder, provoking reaction. This carbon may come from parts of the puddled iron not being thoroughly refined, or from pieces of coal introduced into the bath or ball. Laminations are the result of lack of sufficient temperature, the presence of a ferric cinder, or of the cinder being unable to find egress.

The resistance to corrosion of wrought iron is due to each fiber being enveloped in a ferrous silicate, a stable compound, which is unaffected by the atmosphere; the relatively high phosphorus content permissible and the mechanical combination of two substances, iron and cinder, which offer differing resistances to the same pressure. This latter feature must result in a rough surface, microscopically fine though it be, which is active in holding any protecting agent, such as paint.

The *sinking* of iron or steel scrap in a charcoal hearth, similar to the American bloomery, is one of the processes in vogue today. Here the raw material, being low in metalloids, gives a basic cinder permitting and demanding a higher temperature than is common in the puddling process; otherwise the same general remarks apply, any changes being of degree only, such as, lower cinder contents, less resistance to oxidation, and greater transverse strength. The last is necessary for its chief use as boiler tubes, for which it is admirably fitted.

Bushelling consists in the welding together of miscellaneous scrap, thrown promiscuously on the hearth of a furnace similar to a puddling furnace. The subsequent treatment of the balls is identical with that of puddle balls. In the days when scrap emanated wholly, or largely, from iron structures, the product was wrought iron of good quality, though somewhat more difficult to weld than puddle bar. In the practice of today, when the scrap is of the most nondescript character, with steel greatly predominating, the product—it should not be called wrought iron, but our nomenclature lacks a fitting term—is lacking in uniformity, and the best attributes of genuine wrought iron.

Commercial

Wrought iron has failed to keep its place in the race with soft steel, chiefly on account of the high labor cost. The work is most laborious and requires no little skill. Indeed, the skill of experience in the art, is superior to knowledge of theory. These conditions make it increasingly difficult to obtain men, since the intelligence necessary can obtain higher reward for less effort in other pursuits, with the result that whole districts have abandoned puddling because the furnaces could not be manned. Besides this, the acts of some shortsighted, and not over-conscientious manufacturers of wrought iron, have cheapened the cost of their product at the sacrifice of quality; and soft steel is too often sold, masquerading under the name of wrought iron; sometimes unintentionally, and, it is said with regret, at other times with full knowledge, all tending to narrow the market for wrought iron through ignorance.

[2]Transactions of the American Institute of Mining Engineers, Vol. XXXVI, page 813.

Electric Furnace Methods of Steel Production--VIII

This Article Contains a Compilation of the Data of Costs Covering the Operations of the Various Types of Furnaces Previously Described in This Series

By John B C Kershaw

In the preceding articles of this series a large amount of data were presented relating to the power consumption and operating costs of the various furnaces and processes described. An effort will be made in this article to reduce these data to a form in which the results may be compared more easily. In this connection, it is well to note, however, that when all the values of power, weight and cost of materials have been reduced to one form of expression, there still will remain differences, due to the varying impurities of the raw materials used in this refining process and the extent to which the electric refining operations have been carried in the production of a comparatively pure product. For these reasons, comparative power and cost data involve careful investigation and study before they can be used as guides to the relative efficiency of the numerous electric steel refining furnaces built and the various processes that are being introduced. When chemical analyses of the raw materials are not given, the data for comparative purposes are practically worthless.

The Heroult Furnace and Process

The most reliable figures relating to the operation of the Heroult furnace and process were given by Osborne in one of the articles of this series, which covered the operation of the 15-ton furnace installed at the South Chicago Works of the Illinois Steel Co. These figures indicate that the following analyses can be obtained for steel refined in the electric furnace which first has been blown in the Bessemer converter: Carbon, 0.075 per cent; sulphur, 0.055 per cent; phosphorus, 0.095 per cent; manganese, 0.075 per cent, and silicon, 0.01 per cent. By the application of 1,350 kilowatts during a period of 1 hour and 20 minutes, which is equal to 120 kilowatt-hours per ton, it is possible to produce steel low in sulphur and phosphorus and within reasonable limits of practically any analysis required. The steel made in the Heroult furnace at South Chicago had an elastic limit of 35,000 to 47,000 pounds per square inch; tensile strength, 60,000 to 70,000 pounds per square inch, and elongation, 25 to 30 per cent. It further has been reported that a lower power consumption has been obtained, namely, 103.8 kilowatt-hours per ton of 2,204 pounds and the metal had an average composition of carbon, 0.40 per cent; sulphur, 0.029 per cent, and phosphorus, 0.03 per cent. These results were obtained for eight successive heats at South Chicago.

Cost of Electrodes

With reference to the cost of electrodes, it is estimated that six pounds of carbon is required per ton of finished steel and the cost of roof and hearth repairs is placed at the low limit of 6 cents per ton. Figures given by Eichoff covering the operation of a 3-ton Heroult furnace at the works of Richard Lindenberg & Co., at Remscheid, Germany, show a power consumption of 200 kilowatt-hours per metric ton. These figures cover the use of hot metal charged from a Wellman open-hearth furnace. The raw material in this instance contained an average of 0.01 per cent phosphorus. By the electric refining process, the phosphorus was reduced to an average of 0.004 per cent, while the sulphur in the finished steel varied from 0.007 to 0.012 per cent.

The figures previously given indicate that when molten metal from a converter or open-hearth furnace is employed as the raw material, the refining operation will require from 100 to 200 kilowatt-hours to complete, the power consumption being lowest in the larger furnace.

Operating With Cold Scrap

With reference to the average power consumption of a furnace operated with cold scrap, the subsequent melting and refining processes being carried out with two slags, during the week ending Dec. 24, 1911, a 2½-ton Heroult furnace at La Praz, France, had an output of 62 tons in 26 heats, covering a period of operation of 126 hours. The average power consumption for the week was 528 kilowatt-hours per metric ton and the lowest power consumption was 459 kilowatt-hours per ton.

Estimating the cost of power at South Chicago at 0.5 cents per kilowatt-hour, the cost of the electric refining process at this plant represents an addition of only $1.00 per ton to the cost of the finished steel, while the cost for electrodes and repairs would not aggregate more than 10 cents per ton.

At Sheffield, Eng., the cost of refining molten metal in the electric furnace will vary from approximately $1 to $2 per ton, and when cold scrap is used as raw material for the electric furnace, the cost will be increased to approximately $5 per ton.

The Girod Furnace and Process

The figures previously published covering the power consumption and operating costs of the Girod furnace and process were supplied by the owners of the patents and are based upon the work at Ugine, France. Consequently, they are not so convincing as independent test results. Nevertheless, they may be regarded as trustworthy. The power consumption recorded at the terminals of the furnace and including melting, refining and finishing a charge of cold scrap was about 850 kilowatt-hours for a 3-ton furnace or 750 kilowatt-hours for a 10-ton furnace. These results, of course, will vary with the composition of the charge and according to the quality of the steel to be made.

The electrode consumption per ton of steel made averaged from 4 to 4½ pounds for the 3-ton furnace and from 4 to 5 pounds for the 10-ton furnace. The cost of manufacturing steel in furnaces of various size at Ugine were given in a previous article. The analysis of the finished steel produced by the Girod furnace at this plant follows: Carbon, 0.04 to 1.50 per cent; silicon, 0.20 per cent; manganese, 0.30 per cent; sulphur, 0.015 per cent, and phosphorus, 0.015 per cent.

The scrap used for making this steel had the following analysis: Carbon, 0.35 per cent; silicon, 0.20 per cent; manganese, 0.70 per cent; sulphur, 0.095 per cent, and phosphorus, 0.095 per cent. The maximum physical

tests showed a tensile strength of 137,000 pounds per square inch; elastic limit, 114,000 pounds per square inch, and elongation, 33 per cent.

At Turin, Italy, where the Stassano furnace was tested, using cold scrap, the power consumption of a 200-horsepower furnace was 1,250 kilowatt-hours per metric ton. The electrode consumption per ton of steel produced was estimated at 60 cents and the cost of refractory materials varied from $1.93 to $2.93. At Bonn, Germany, where the tests of this furnace were made, the cost of raw materials, including additions, per ton of steel aggregated $16.66; electric power 1,000 kilowatt-hours at 1.071 cents per kilowatt-hour, $10.71; lining, $2.85; labor, $2.38; interest and depreciation, $1.19; electrodes, 60 cents and water for cooling purposes, 12 cents. The total cost per metric ton of cast steel was $34.51. Analyses of steel produced in this furnace follow:

No. 1.—Carbon, 0.235 per cent; silicon, 0.195 per cent; sulphur, 0.047 per cent; phosphorus, 0.031 per cent and manganese, 0.546 per cent.

No. 2.—Carbon, 0.207 per cent; silicon, 0.236 per cent; sulphur, 0.043 per cent; phosphorus, 0.027 per cent and manganese, 0.421 per cent.

No. 3.—Carbon, 0.36 per cent; silicon, 0.14 per cent; sulphur, 0.052 per cent; phosphorus, 0.036 per cent and manganese, 0.486 per cent.

Table I.

POWER CONSUMPTION IN KILOWATT-HOURS PER METRIC TON (2,204 POUNDS) OF STEEL PRODUCED IN ELECTRIC FURNACES

Type of electric furnace.	Cold Charges of Scrap.	Pig and wrought. iron.	Average.	Hot charges from Wellman open-Bessemer hearth converter.	Stationary open hearth furnace.	Cupola.	Average.
Heroult	459	...	493	104	200	... ...	146
	528	...	...	133	...	... ...	...
Girod	750	...	800	...	200	... ...	237
	850	...	...	...	275	... ...	...
Stassano	918	...	...	...	...	... ...	...
	956	...	...	...	...	... ...	...
	1,000	...	1,071	...	...	... ...	...
	1,250	...	...	...	...	... ...	...
	1,260	...	...	...	...	... ...	...
Kjellin	650	...	747	...	...	... ...	...
	790	...	...	...	...	... ...	...
	800	...	...	...	...	... ...	...
Rochling-Rodenhauser	640	...	773	125	280	... 280	214
	780	...	...	150	...	... ...	...
	900	...	...	200	...	... ...	...
	...	...	...	250	...	... ...	...
Keller	...	...	...	...	...	275 ...	275
Frick	780	...	790	...	...	... ...	...
	800	...	...	...	...	... ...	...
Hiorth	...	680	700	...	...	... ...	...
	...	720	...	...	...	... ...	...
Colby	605	...	715	...	...	... ...	...
	825	...	...	...	...	... ...	...

The Kjellin and Rochling-Rodenhauser Furnace and Process

Under the most favorable conditions, steel can be melted in the Kjellin furnace with an expenditure of 590 kilowatt-hours per metric ton. However, the maintenance of the proper temperature during the killing or degasifying period adds from 60 to 200 kilowatt-hours to this total. Tests made with a 125-kilowatt furnace of the original Kjellin type demonstrated that under the most favorable conditions, one metric ton of tool steel can be made with an expenditure of 650 kilowatt-hours, while high grade steel requires from 750 to 800 killowatt-hours.

With reference to the power consumption and cost of operating the combined Rochling-Rodenhauser type of induction furnace, complete estimates and data are available. When molten metal from the Bessemer converter is charged into the furnace, from 125 to 150 kilowatt-hours are required per ton of steel and 130 kilowatt-hours may be considered as a good average. It further has been stated that a 10-ton electric refining furnace operating on basic Bessemer steel will require from 200 to 250 kilowatt-hours per metric ton, the steel before treatment having contained 0.08 per cent phosphorus and 0.09 per cent sulphur. These impurities were reduced to one-tenth of this amount after the completion of the refining operation. It also is stated that the Rochling-Rodenhauser type of induction furnace will melt cold scrap with an expenditure of 580 kilowatt-hours per ton. At Volkingen, Germany, a 2-ton furnace has produced steel from cold scrap at a cost of $21.75 a ton. The cost of the raw material was $12.60, which is considerably below the present market value. Operating on hot metal, with raw material at $12.00 per ton, the cost of the steel made in the electric refining furnace is $19.06 per ton. The time of the latter heat was 2½ hours, while with cold scrap, from 4 to 4¼ hours were required. The cost of refining steel from metal melted in the cupola was estimated at $23.02, with raw materials at $14 per ton. The time of the heat was 3½ hours.

The Keller Furnace and Process

The only data available covering the power consumption and operating costs of the Keller refining furnace are those received from the patentee, which were previously published in one of the articles of this series. They relate to the operations of an 8-ton furnace and are based upon the use of molten metal from an open-hearth furnace. The time of making the heat is estimated at 2 hours and

Table II.

CHEMICAL AND PHYSICAL TESTS OF STEEL PRODUCED

Type of Furnace.	Chemical Analyses. Carbon, per cent.	Sulphur, per cent.	Phosphorus, per cent.	Physical Tests. Elastic limit, pounds, per square inch.	Tensile strength, pounds, per square inch.	Elongation, per cent.
Heroult	0.40	*0.055*	*0.095*	35,000	60,000	25
	....	0.029	0.030	47,000	70,000	30
	....	0.009	0.004	.....	.....	..
	....	0.012	.....	.....	.....	..
Girod	0.35	0.095	0.095	39,000	50,000	9
	0.04	0.15	0.015	114,000	137,000	33
	1.50	.....	.....	.....	.....	..
Stassano	0.267	0.048	0.031	.....	61,300	18
	0.380	0.038	0.026	.....	90,816	19
Rochling-Rodenhauser	.....	*0.090*	*0.080*	.....	89,600	..
	....	0.009	0.008	.....	117,600	..
	....	0.035	0.048	.....	.....	..
	....	0.008	0.0095	.....	.....	..
Keller	*0.15*	*0.06*	*0.007*	.....	.....	..
	0.44	0.009	0.008	.....	.....	..

The chemical tests in this table represent an average for a particular class of steel. The percentages in italics represent the average composition of the raw materials used while the percentages immediately below these figures represent the composition of the steel produced. The figures for the physical tests represent the minimum and maximum results.

45 minutes and the power consumption per metric ton is 275 kilowatt-hours. The electrode consumption is approximately 22 pounds per ton.

The power consumption of the Frick electric induction furnace, according to Lyman, is 600 kilowatt-hours per ton when melting cold scrap and from 180 to 200 kilowatt-hours per ton when refining steel, a total of 780 to 800 kilowatt-hours per ton of finished steel. According to figures given by Richards, 530 to 550 kilowatt-hours are required to melt one ton of pig iron in the Hiorth induction furnace and from 150 to 170 kilowatt-hours are required to complete the refining operation, making a total of from 680 to 720 kilowatt-hours for refining each ton of cold metal. The Colby furnace shows a power consumption of 605 to 825 kilowatt-hours per metric ton of metal refined.

To permit of a better comparison of the cost and operating data presented, these figures have been compiled in Tables I and II. Table I shows the power consumption of the various furnaces and in Table II are included the chemical and physical tests of the raw materials used and the refined steel. Operating costs cannot be compiled satisfactorily, as the costs of raw materials, labor, etc., vary considerably in different countries and under different trade conditions. Other charges being equal, the furnace and process that shows the smallest power consumption will prove the cheapest to operate, as the cost of power in every case is the largest item of expense to be considered in the operation of the furnace.

Motion Pictures in Industry

The extent to which motion pictures are now being used in the commercial world for educational and advertising purposes is not generally realized. The iron and steel trade, however, has recently had a striking example of the employment of films as a business aid in the series entitled "From Mine to Molder," now being shown throughout the country by Rogers, Brown & Co., Cincinnati. A number of other prominent firms also are making successful and profitable use of these views. The International Harvester Co., through Edwin L. Barker, for instance, has carried this form of publicity to a very high point and has found the work directly educational as well as productive of results. Mr. Barker estimates that he entertains and educates his audiences, and drives home the merits of his company's product at a cost of less than 1 cent per capita.

The Jaeger Machine Co., Columbus, O., is using motion pictures to demonstrate heavy machinery and it it said that its salesmen have found them to be a very valuable aid. The Holt Caterpillar Co., the General Vehicle Co., and the National Cash Register Co. are among other prominent users of motion pictures. These firms have proved that they can create and circulate films at a cost of about 2 cents for each person seeing the exhibition.

Motion pictures are probably even more valuable for purely educational purposes and in this field the National Association of Manufacturers is undoubtedly a pioneer. This association recently has produced three films through the co-operation of the Edison Co., which deal with important factors relating to our industrial life. These films will be given a wide distribution throughout the entire United States. They deal respectively with the subjects of accident prevention, fire prevention and industrial education in a very graphic manner.

In each case a photo-play has been written, designed not only to drive home the lesson, but to contain such elements of dramatic value and human interest as to appeal strongly to the audiences.

The film dealing with accident prevention commences by illustrating the chance meeting of a young Italian machinist with the daughter of an old workman in a prominent machine shop. Through the influence of the girl's father, the young man is given a position in the shop, running a large lathe. The lathe is provided with a special safety device to guard the chuck. The foreman points out the value of this device to the young workman, but the older man has been in the shop so long that he has grown to have a contempt for all safety appliances. Through his influence, the young man becomes careless in the use of the safety device and one day his arm is caught in the chuck and mangled. In the meantime a love affair has grown up between the young workman and the daughter of the older man.

The young man is taken to a hospital and the older one has the value of safety devices impressed upon him in a very tragic manner. In the same way the two films illustrating the need of fire prevention and industrial education have been developed. These films will be shown especially in factory towns and on account of their human interest, the effectiveness of their appeal readily may be imagined.

Large corporations also are using films of a less dramatic nature for instruction purposes. For instance, the Illinois Central railroad is considering the production of a series of films to illustrate fuel economy in locomotives. This picture will be taken over the entire system in a special car, making stops at every division point. Lectures will be delivered in the morning, afternoon and evening. Other concerns are using moving pictures in connection with time study work in their shops.

At the present time there are a number of concerns which make a specialty of the commercial motion picture business. They are being conducted to develop, create and build commercial motion pictures based on the idea that every business product or manufacturing process has a human interest story hidden in it somewhere. This story can be found and developed into camera copy. Among these corporations may be mentioned The Advance Motion Picture Co., Chicago, and the Motionscope Co., Indianapolis, Ind.

Motive Power for Electric Generation

During the past year, large complete expansion steam turbines have been demanded and it is said that negotiations are now in progress for the building of units which will have generating capacities as high as 25,000 to 30,000 kilowatts. Smaller turbines also have been used more generally than before for the driving of centrifugal blowers and deep well pumps. The gas producer, which for many years has enjoyed a steady though slow growth, has been favored more during the past year than previously. This has been due to the steadily increasing price of fuel oils.

Preparing Cuban Ore for Blast Furnace Use[1]

A Discussion of the Nodulizing, Sintering and Briquetting Processes as Applied to Mayari Ore

By R B Gerhardt

Within the past decade, the so-called brown iron ores of Cuba have been investigated and the various deposits have been fully prospected. The greater part of the deposits in Oriente province is an earthy mass, dark red to yellow in color, having a clay-like consistency, and is dominantly a limonite. Until the present time, this ore has been mined in quantity only in the Mayari district. A representative analysis of this ore is about as follows:

	Samples.	Per cent.
Iron, dried at 212 deg. Fahr.	918	46.03
Silica	918	5.50
Alumina	889	10.33
Chrominum	889	1.73
Phosphorus	889	0.015
Nickel	889	1.04
Hygroscopic water	61	31.63
Combined water	37	13.62

Furnacemen agree, that, on account of the high moisture content of the ore and its extreme fineness after the moisture is driven off, it does not give satisfactory results used directly in a blast furnace, and, therefore, some preparation is necessary preliminary to the smelting. The high transportation charges on raw ore carrying over 40 per cent of moisture necessitates drying before shipment from Cuba, and any successful preparation of the ore embodies not only drying, but also putting it into a less finely divided state, or agglomerating it. There are three practical methods of accomplishing this, namely, briquetting, sintering, and nodulizing.

Briquetting

Briquetting-processes may be divided into two classes, those that require the use of a binder and those that do not. The former class, if applied to this ore, require that it shall have a preliminary drying, and the extent to which this drying is carried, is the principal factor in determining the strength of the finished briquette and its power to resist disintegration on handling or application of high temperatures. The preliminary drying, if carried a step farther, would be practically the same as nodulizing, so that the briquetting feature could be left out, and the process would be more practical.

Without the use of a binder, briquetting is more applicable to this ore on account of its clayey condition. No preliminary drying is necessary. The Grondal process, which covers this method, consists in briquetting the ore in its raw state at a comparatively low pressure, then burning the bricks at a high temperature in a furnace, the same operations as are used in the manufacture of ordinary brick. The brick-forming machine is a specially-constructed auger or wet-mud press into which the raw ore, of proper moisture consistency, is fed, and from which it is discharged through a die and placed on small cars preparatory to entering the furnace. The Grondal furnace is of the channel type, about 195 feet long and 6 feet wide, the bottom of which is a continuous, movable platform, formed by small structural steel cars carrying the briquettes to be treated. These cars have fire-brick tops, overlapping ends, and side flanges which dip in troughs of sand. The furnace walls are double, fire brick inside, and red brick outside, the two usually being separated by an air space, which keeps down the radiation loss and allows for expansion.

Furnace Heated by Gas

Gas, introduced through a raised arch at a distance of about two-thirds of the furnace length from the entrance end, is used for heating. Most any gas of the proper heating value can be used, but blast furnace gas alone is usually too dilute and needs enrichment with producer gas to give the proper temperature. Crude oil is sometimes used for fuel. Preheating of the briquettes occurs in the first third of the furnace, then they come into zones of higher temperature until a maximum of about 2,500 degrees Fahr. is reached at the combustion chamber, and from this point, as the cars move forward, cooling is accomplished by means of air blown in the discharge end of the furnace with a suitable fan. The arch over the cooling chamber is double, and the air that is used for combustion, passes through the space between arches and reaches the combustion chamber at a temperature of from 400 to 600 degrees Fahr. The gases, passing from the furnace to the stack, have a temperature varying from 350 to 500 degrees Fahr. The discharged briquettes are sufficiently cool to handle directly into railroad cars. They are dark blue in color, firm, fused into a strong mass and porous.

Two sintering processes are readily adapted to the treatment of this Cuban ore. These include the Dwight Lloyd and the Greenawalt processes. The Dwight Lloyd process consists in mixing the ore with a proper amount of fuel, coal or coke crushed to ¼-inch size or smaller, in a pug mill or other suitable mixer, then placing this mixture is a furnace where it is ignited, and internal combustion takes place, aided by a draft or suction of air, produced by a suitable fan or other means. Sintering or agglomeration takes place, starting at the ignition side of the mass, and proceeds through it until the entire charge has undergone this change. The sintered product is not usually in as large and compact lumps as briquettes, but it is cellular and open, similar to porous cinders, and is considered ideal for use in a blast furnace.

The Greenawalt process resembles very closely the process just described except that a porous bed, made up of the crude ore without any fuel, is used directly under the furnace charge, and the air is passed downwardly through the mass by means of a suction acting from below.

Straight Line Conveyor Furnace

The Dwight Lloyd furnace best suited for sintering iron ore is the standard straight-line, conveyor type. The machine consists of an endless train of small cast iron pallets or conveyor pans, carried on small rollers, which are pushed along a track over a suction or wind-box. The pallets are without sides, but have ends and bottoms well planed to form an air-tight joint as they are pushed along, and the train forms a trough for receiving the charge to be sintered. The pallet bottoms are built in the form of herring-bone grates. The openings in these grates allow air and gases to travel through the suction box and piping to an exhaust fan. A pair of driving sprocket wheels lift the pallets from

[1]Presented before the Engineers' Society of Pennsylvania.

the lower to the upper track level and push them horizontally over the suction box. At the discharge end of the furnace, the pallets drop part of the way to the lower track level through semi-circular guides and the jar thus produced serves to loosen and discharge the sinter. Usually an oil burner is used for an igniter, and this is located just above the charge, directly over the end of the suction box towards the feed end of the machine. The speed of the machine is arranged so that proper ignition is secured and the charge thoroughly sintered during the time of its travel over the suction box. The capacity of the machine is limited by the weight of carbon burned per unit of time. The discharged sinter can be handled directly into cars.

The Greenawalt Furnace

The Greenawalt furnace differs from the one just described in that the sintering operation is intermittent instead of continuous. It consists essentially of a cast iron or steel pot mounted on hollow trunnions, with a grate inserted parallel to its bottom. A suction fan is connected through the trunnions to the space below the grates. A perforated, tight-fitting cover is used on the pot during ignition. The cycle of operations is about as follows: First a light bed of green ore is placed on the grates, and the charge is distributed uniformly over this; the cover is then put in place and oil is sprayed into it and ignited, filling the entire space between the cover and charge with flame. Starting the fan draws this flame down through the charge, then the oil spray is cut off, the cover is removed and the sintering is allowed to take place throughout the entire mass. The fan is then stopped, the pot turned on its trunnions and the sinter is discharged into a car or other suitable device for handling into a stock pile. Turning the pot back into a horizontal position ready to receive a new charge completes the cycle.

Nodulizing

The nodulizing process is similar to the clinkering process used in the manufacture of cement. It has been exploited on a large scale in preparing Cuban ore by the Spanish-American Iron Co., at the Felton plant in the Mayari district.

A mechanical feeder introduces the ore through a chute into one end of a rotary kiln, which is identical with that used in cement practice, and heat is applied at the opposite end. In its passage through the kiln, the moisture is driven from the ore, and it is heated to a temperature of incipient fusion, the fine particles forming into little balls or nodules. When the proper temperature is maintained in the kiln, the output will contain very little fine material which will pass a 40-mesh screen. Owing to the infusible characteristics of the gangue in the ore, a maximum kiln temperature of 2,700 degrees Fahr. gives best economical results, and at this temperature, the product averages about 93 to 95 per cent above 40-mesh size.

The rotary kiln is a cylindrical shell or tube of steel plates lined with fire brick, supported by steel tires carried on rollers, and driven by a system of gearing. Kiln dimensions vary from 5 feet diameter by 60 feet long up to 12 feet diameter, 235 feet long. In modern practice the larger sizes are more common. A great many kilns have been built, which taper from a large diameter at the discharge end, to a small diameter at the feed end. A properly designed kiln will expose the material passing through it to the hot gases for a sufficient length of time to accomplish the desired result with a suitable rate of heat transfer, keeping the discharge gases at a low temperature, from 350 to 600 degrees Fahr. The gas velocity in the kiln depends upon the draft and the size of opening at the feed end. If this velocity is too high, an efficient heat transfer is not accomplished, and if too low, the capacity of the kiln is cut down.

Operating the Kilns

Kilns are usually driven by variable speed motors at a speed of from one revolution in 30 seconds to one revolution in two minutes, depending to a great extent on the diameter and slope. High alumina fire brick is used for the lining, which is ordinarily nine inches thick for a distance of two-thirds of the kiln length from the discharge end, and six inches thick through the remaining one-third length. The material in the brick should be finely ground, and the brick for the discharge end should be hard burned. At this end of the kiln, the lining fails first, due to the high temperatures and abrasion.

The fuel for nodulizing may be almost any kind of gas, tar, crude oil, or pulverized coal. Where waste gases are not available, pulverized coal is the cheapest fuel. A 30 to 35 per cent volatile coal, with 9 to 12 per cent ash, gives very good results, and the finer it is pulverized, the lower will be the fuel consumption. Ninety-two to 95 per cent passing a 100-mesh screen is about the proper fineness. A common form of burner for pulverized coal consists of a pipe, four to eight inches in diameter, one end of which protrudes through the kiln hood somewhere near its center, and the other end connects with an air nozzle directly above which the coal is introduced. The air nozzle, which may be of high or low pressure type, produces an injector effect, sucking in the fine coal, intimately mixing it with the air, and finally discharging it into the kiln ready to burn.

Lighting the Kilns

In lighting, a wood fire is built in the kiln, but after the lining is sufficiently heated the coal burns immediately on leaving the burner pipe. Preheating the air used in the burner results in a saving of fuel. The quantity of air and coal going to the burner may be regulated to give the desired flame. A short, intense flame close to the mouth of the kiln gives best thermal results, but such a flame used in nodulizing Mayari ore causes the ore to stick to the lining and build into a heavy mass or ring after four to eight days' operation. Such a ring, beyond a certain size, seriously affects the output of a kiln. With this short flame it is very hard to obtain good, coarse nodules, as there is not sufficient time, after the ore particles have reached the high temperature, for them to roll up into the proper size nodules before they are discharged from the kiln. With a longer flame producing a hot zone not directly in the mouth of the kiln, the formation of rings with the large diameter kilns is not so serious, as a good operator can more easily keep them under control. A medium size ring, if not burned too hard, can be made to drop out of a 10-foot diameter kiln by intermittently heating and cooling it through a temperature range of from 700 to 1,000 degrees Fahr.

Handling Nodules

The nodules are discharged from a kiln at a temperature close to 1,700 degrees Fahr., either into a mechanical cooler or into a conveyor or pit, and cooled with water. At the Felton plant, the nodules are discharged into a pit of water and then are loaded with a grab bucket crane into transfer cars.

The advantages and disadvantages

than in either of the other processes.

Briquettes, from the molding machine or press, have to be placed by hand on the cars which carry them through the furnace, thus making the labor costs high.

Sintering Furnace Subjected to Lower Heat

The furnace parts in the sintering process are not subjected to such a high heat as is the case in the other processes, and, consequently, they have a longer life.

The sintering units are of small capacity, as compared to the other process units.

There is always some raw material in the sintered product, and although this may be kept down to a minimum, it is practically impossible to eliminate it altogether.

Nodules are not generally considered as good for use in the blast furnace, as either briquettes or sinter.

The principal eastern steelmakers interested in the Cuban brown iron ore deposits, the Pennsylvania and Maryland Steel companies, have discontinued the use of this ore in the raw condition. Practically the entire tonnage consumed at the present time is in the form of nodules, the product of the extensive plant of the Spanish-American Iron Co., at Felton, Cuba. The tonnage consumed as sinter does not amount to more than 1,500 per month.

During the process of nodulizing the ore loses all its water and there results a concentration of the elements present and the nodules analyze about as follows:

	Per cent.
Iron natural	54.56
Iron dried at 212 degrees	53.37
Silica	3.64
Alumina	13.77
Manganese	0.79
Sulphur	0.04
Nickel	0.87
Chrominum	2.01
Phosphorus	0.016
Moisture	1.87

This is the ore which the furnace man is called upon to smelt. It is classed as a high grade Bessemer ore and is of exceptional quality, due to its low sulphur content and also on account of the presence of nickel and chromium.

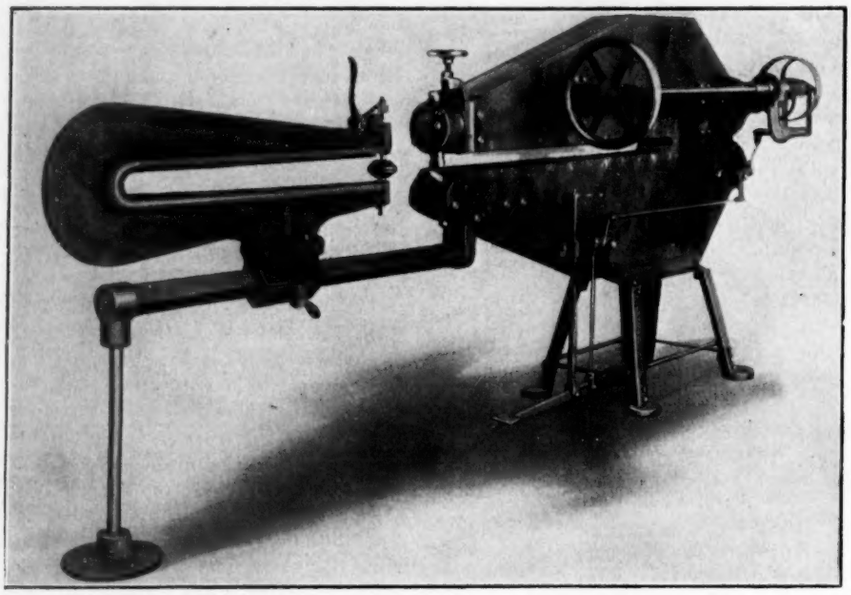
Furnace Slags

Due to the high alumina content of the ore, the slags used in the furnace operation must naturally run high in alumina. The furnace practice on lake ores requires slags running from 28 to 32 per cent silica and 8 to 14 per cent alumina. With the introduction of Mayari ores it was evident that with large percentages in the furnace mixtures, slags running 20 to 25 per cent silica and 25 to 30 per cent alumina would result. This is where furnace men hesitated, for it had been a fairly well-defined opinion that alumina had a tendency to make the slag viscous, therefore, from a theoretical standpoint it was considered impossible to handle a slag running as high as 30 per cent alumina. Practice has disproven theory, however, to a certain extent, as furnaces have been operated with as high as 87 per cent Mayari nodules, with slags up to 38 per cent alumina, with no great difficulty. The fuel consumption is higher than in lake ore practice by 20 to 30 per cent, due partly to the refractory character of the gangue materials and partly to the large slag volumes handled.

My experience does not cover the working of briquetted Mayari ore in a blast furnace. Such ore has only been used in any large percentage on test runs for short periods and really forms an unimportant phase of the question at hand. In like manner no very extensive runs have been made using sintered ore. On account of the fact that this material in the process of sintering is heated to the point where it becomes fluid and forms a clinker, the opponents of this process argued that it would act like a mill cinder in a blast furnace, that it would be difficult to reduce and thus require high fuel consumption. From our limited tests, using up to 50 per cent of sintered Mayari ore on the furnace mixture, these arguments have been entirely disproven. On the contrary, with three-eighth sinter in the furnace mixture a reduction of 5 to 8 per cent fuel was noted, the general furnace conditions were improved and the pig iron tonnage increased approximately 5 per cent, as compared with the same furnace operating on three-eighth Mayari nodules.

The Pig Iron

In regard to the pig iron derived from the reduction of Cuban brown iron ore or Mayari ore, the elements which give it a distinguishing character are nickel and chromium. The amount of these elements depends entirely upon the per cent of Mayari ore in the blast furnace burden. They invariably occur in the iron in the approximate ratio of chromium to nickel of 2 to 1. With 100 per cent Mayari in the burden, the iron will contain about 2.80 per cent chromium and about 1.40 per cent nickel, while with any smaller proportion of Mayari in the burden, there is a proportional decrease in chromium and nickel. Although of very little use in its original condition on leaving the blast furnace except to form a small part of foundry mixtures, this iron lends itself admirably to the manufacture of high grade steels.



ROTARY METAL SHEAR FOR CUTTING IRREGULAR SHAPES

Rotary Sheet Metal Shear

The accompanying illustration shows a shear, built by the Niagara Machine & Tool Works, Buffalo, which is designed to cut sheet metal up to No. 12 gage. As may be seen in

the illustration, the cutters are two rotary discs, the upper one being carried on a turret and the lower on an inclined shaft. The upper disc, which is mounted on the turret, may be removed easily for regrinding by swinging the turret to one side.

The fact that both cutters are power-driven assists greatly in feeding the work. In cutting difficult or intricate designs, after the pattern has been scribed on the sheet, the operator may use the hand feed for following the most complicated part and the power feed for the remainder. The cutter shafts are driven from two horizontal shafts, which in turn are geared to the pulley shaft. The foot treadle controls a jaw clutch by which the machine is thrown in or out of gear.

By the use of the circle cutting attachment, discs or rings from 3 to 60 inches in diameter may be cut from a square blank. The shear itself will cut curves and discs as small as 1¼-inch radius. The cutting head has a throat, 60 inches deep.

The advantages of the poppet valve are said to be no rubbing surfaces and hence no lubrication and its adaptability for high temperature; small weight and practical balance, hence its adaptability for high speed.

Cam Cutting Machine

A small size cam cuting machine is now being built by the Garvin Machine Co., New York City, which is especially adapted for the cutting of face and barrel cams and is designed for the use of lubricants.

Fig. 1 shows the machine as arranged for cutting face cams. Fig. 2 illustrates the machine with the barrel cutting fixture in place and set for the cutting of barrel cams. The change from the barrel cam fixture to face cutting may be quickly made.

The spindle is provided with ball bearings similar to those used in profilers and is said to be very sensitive. The rail side is operated by a rotary nut with ball-thrust, which permits of rapid motion for the removal of the cutter and former pin on the completion of the cam. The spindle slide is clamped in position while making the change and has its return to a positive micrometer stop.

The design of this machine closely follows the standard employed on the 24 and 36-inch cam cutting machines made by this company. The cutter, as shown in the accompanying illustrations, is designed for cutting any type of cam from 1 to 12 inches, using cutter heads from 3-16 inch to 1 inch, and has three speed changes on the cone pulley and eight feed changes by shifting gears. The tables are 12 inches in diameter and are spaced 12½ inches apart. The maximum and minimum distances from the end of the spindle to the rotary table are 11¼ inches and 3¼ inches, respectively. The barrel fixture has a swing of 14½ inches.

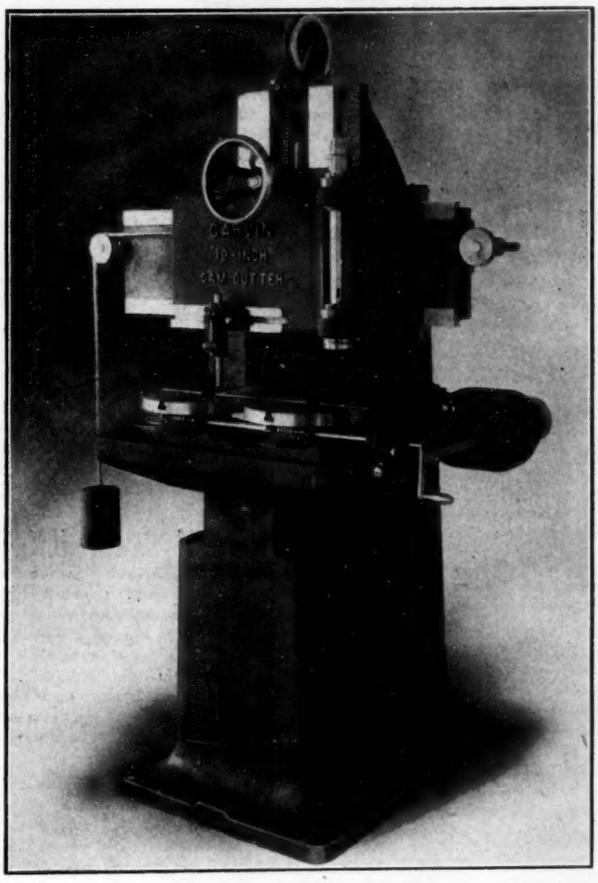


FIG. 1—CAM CUTTING MACHINE ARRANGED FOR CUTTING FACE CAMS

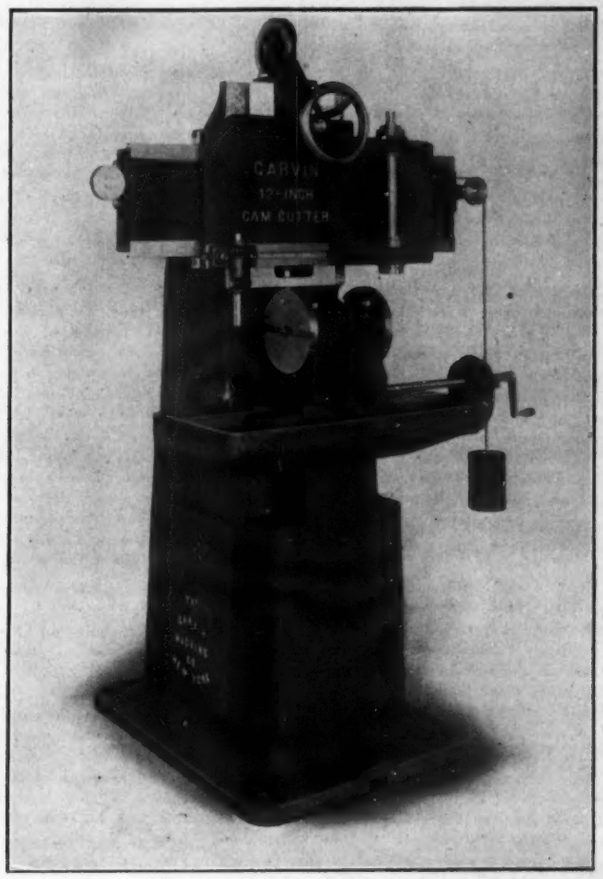


FIG. 2—MACHINE WITH THE BARREL CUTTING FIXTURE IN PLACE

Smoke Abatement

The bureau of mines recently has issued a bulletin entitled "City Smoke Ordinances and Smoke Abatement," in which the author, Samuel D. Flagg, states that in his opinion "strict control of furnace construction offers much greater hope for smoke abatement than desultory imposition of severe penalties on the escape of dense or black smoke." The writer further lays stress on the necessity of the creation of a public sentiment in support of smoke control to prevent failure of efforts along this line. In outlining the factors which must be taken into consideration in the study of conditions in any given city, mention is made of topographical and climatic conditions, character of fuel used for commercial and domestic purposes, nature of the industrial activities and volume of railroad or

steamship traffic. In cities of less than 20,000 inhabitants, where the employment of a paid inspector would be too great a burden, the best results can be obtained through concerted action of members of a local chamber of commerce.

It would appear that the greatest reduction in smoke emission has been accomplished in stationary steam boiler furnaces, although many of the railroads issue to their firemen instructions for the prevention of smoke and waste of fuel and some of the roads maintain a force of instructors. This has brought about better conditions on locomotives, though much greater care has been given to the firing of passenger locomotives than to those hauling freight and in switching service.

The attempts which have been made to reduce smoke emission by the use of gas fuel, oil or pulverized fuel have not been entirely successful. In fact, it is claimed that some of the furnaces using these fuels were actually made worse by the change.

Reviews of New Catalogs

SHOP EQUIPMENT.—The W. P. Davis Machine Co., Rochester, N. Y., has issued illustrated circulars describing 14 and 16-inch lathes equipped with variable speed motor drives and also a 20-inch, back-geared, power feed drill. This drill is designed for the use of high speed tools and is provided with a square table having oil grooves for the recovery of lubricant. A 6-inch cutting-off machine also is shown.

MELTING FURNACES.—A four-page, illustrated leaflet, issued by the W. S. Rockwell Co., New York City, describes its line of tilting crucible melting furnaces for aluminum, brass, bronze, copper, gold, silver and other non-ferrous metals. It is claimed that a clean metal insuring sound and strong castings with the lowest possible shrinkage is obtained by the use of these furnaces. A table is included giving the various capacities and dimensions of four different sizes.

MOTOR TRUCKS. — The Sternberg Mfg. Co., Milwaukee, has issued a catalog illustrating and describing the Sternberg motor trucks in 2, 3, 4 and 5-ton capacities. It is claimed that the first Sternberg truck, which was built more than seven years ago, is still doing service. This truck was used by an express company. Details of motors, chassis, etc., are shown, together with a wide variety of body mountings adapted to different classes of service.

AIR COMPRESSORS AND PUMPS.—The Kinney rotating plunger pumps and air compressors, belt, chain and gasoline engine-driven, are described in bulletins issued by the Kinney Mfg. Co., Boston. These pumps are said to meet the demand for a power-driven pump for heating plants supplied by low-pressure boilers, also as vacuum pumps on air lines either with or without automatic control. The valves have been eliminated, which prevent the pump from becoming air or steam-bound.

ELECTRIC FORGE BLOWERS. — The Emerson Electric Mfg. Co., St. Louis, has issued an illustrated bulletin describing its line of electric forge blowers for the use of blacksmiths and wagon makers, and in other establishments where one or more forges are operated. These blowers may be had with alternating or direct current motors equipped for operating one or two forges. The direct current machines are furnished with a special speed regulator by which the pressure may be reduced as low as 1-10 ounce.

ELECTRIC MOTORS AND SUPPLIES. —A leaflet describing the Westinghouse two and three-phase, 60-cycle motors, in units of from 30 to 250-horsepower, has been issued by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. These motors, which are started in the same manner as induction motors, that is, by means of an auto-starter, are said to be a desirable drive for pumps, fans, air compressors, etc. A folder from the same company explains the use of its cement for repairing commutators.

INCLINE RAILWAYS.—The Otis Elevator Co., New York, has issued a 28-page, illustrated catalog of incline railways. For purposes of classification, these are divided into tourist-passenger inclines, traffic inclines and commercial inclines. Traffic inclines are pointed to as a means of making easily accessible parts of a city which otherwise can only be reached by long detours or difficult paths. Commercial inclines have been utilized for hoisting stone in quarries, ore, coke and limestone in blast furnaces, transferring baggage and freight between two sections of railroad on different levels, etc.

PUNCHES AND SHEARS.—A 40-page, illustrated catalog has been issued by the Watson-Stillman Co., New York, describing its line of lever punches and shears for hand and power use. Illustrations and specifications are included of steel screw punches, hand punches, channel iron punches, combined hand punches and shears, wire rope shears, cable cutters, power punches, combined power punches and shears and other machines to meet practically any requirement in this line from the lightest to the heaviest of work. Several pages of this catalog are devoted to parts and fittings.

METAL MELTING FURNACES. — The Hawley Down Draft Furnace Co., Easton, Pa., has issued an illustrated catalog presenting the merits of the Hawley, mechanically-operated, tilting converters and furnaces. The adaptability of this furnace for use in plants which at times require small heats is explained and also its availability for refining and recarbonizing processes. Tables of dimensions and capacities, together with cross-sectional views showing the method of construction of the furnace, are given. Various additional data of interest to founders and steelmakers are included.

FRICTION CLUTCHES. — An illustrated 40-page booklet, showing a wide variety of applications of the Johnson friction clutch, has been issued by the Carlisle Johnson Machine Co., Manchester, Conn. Milling machines, boring and turning mills, automatic screw machines, cold saws, drill presses, pipe threading machines, lathes, printing presses, knitting machinery and many other types of devices and equipment have been improved or further convenienced by the application of this clutch. An illustration also is shown of a mounting with a steel split pulley similar to the more common mountings of friction clutches.

STEEL FENCE POSTS.—Steel fence posts, which have had the test of more than 12 years' service, are described by the Inland Steel Co., Chicago, in a 16-page, illustrated booklet. Originally these posts were shipped from the factory with a concrete sub-base attached. However, freight expense prohibited shipment to any great distance and the use of these posts did not become as general as it now promises, since the more general diffusion of knowledge relative to the use of concrete. These posts also are provided with steel bases when desired. General information concerning erecting, setting of end and corner posts, stretching of fence, etc., is included in the booklet.

ELECTRIC HEATING FURNACES.—Two 16-page, illustrated booklets have been issued by the Electric Furnace Co., Alliance, O., describing its electric heating furnace for heating bars and billets, and giving comparative data as to operation costs of electric and oil furnaces. This company is said to have extensively studied the problem of the utilization of waste energy for the heating of metal in forging plants and as a result, plans have been perfected for the utilization of exhaust steam from forge hammers to operate steam turbines to drive generators. As the amount of waste steam from the hammer is directly proportional to the amount of work being done, a balance is obtained at all times between the power required and the power available.

ELECTRICAL EQUIPMENT.—Three illustrated booklets, issued by the General Electric Co., Schenectady, N. Y., present data and suggestions for the use of electricity in excavation and construction work, and the advantages of Mazda lamps for standard lighting service. In connection with the excavation and construction work, reference is made to the use of motors and generators on the Panama canal, the Catskill aqueduct and the New York barge canal. On these constructions, cableways, steam shovels, cranes, derricks and locomotives have been equipped with electrical motive power. For those interested in lighting problems, various data and distribution curves for reflectors, as well as numerous wiring devices, have been embodied in an attractive catalog.

LOCOMOTIVE BOILERS.—An illustrated publication from the Jacobs-Shupert U. S. Fire Box Co., Coatesville, Pa., describes the tests recently made by Prof. W. F. M. Goss, dean of the College of Engineering, University of Illinois, of a Jacobs-Shupert boiler in comparison with a radial-stay boiler. Three pages of this publication are devoted to a historical sketch of the developments of the locomotive boiler, following which, the design of the modern radial-stay boiler is gone into in some detail and statement made of some of the theoretical and practical advantages claimed for the Jacobs-Shupert. According to the author, two boilers, one of radial-stay design and the other of the Jacobs-Shupert design, were built as nearly alike as possible. These two boilers were submitted to exhaustive tests to determine their relative evaporative efficiencies and their behavior with low water. It is claimed that the Jacobs-Shupert boiler suffered no damage whatever in the low water test, while the radial-stay boiler failed. A detailed tabulation of the data taken during the course of this experiment are included.

MINING NEWS FROM THE IRON RANGES

Ore Rates Withdrawn

The Northwestern, St. Paul, South Shore, Lake Superior and Munising railroads have asked permission of the railroad commission to withdraw the new tariff on ore rates, which had been suspended pending a hearing. The change provided an extra tariff of 5 cents per ton on ore remaining in the cars at the docks for 10 days or any part thereof and an additional 5 cents for ore remaining in the cars for each 10-day period or fraction thereof. Permission to withdraw the rates was granted and the cases will be dismissed. Among those in Lansing for the hearing were W. W. Walker, general manager of the South Shore; W. P. Belden, chief counselor for the Cleveland-Cliffs Iron Co.; H. R. Harris, general manager of the Lake Superior & Ishpeming; H. C. Cheney, of the Northwestern; H. R. Young, of the Republic Iron & Steel Co., and W. A. Sproule, of the Cambria Steel Co.

The ore-hauling rates in the Lake Superior region always have been fixed on a flat basis, irrespective of the length of the haul. This has put the mines of each range on an equal footing as far as that particular range is concerned. As between the ranges, the rate differs widely. Figured on average distances, the per ton mile charge from the Mesabi range to Superior, 115 miles, is 0.00522 cent; Marquette range to Escanaba, 70 miles, 0.0057 cent; Ely to Two Harbors, 94 miles, 0.00630 cent; Mesaba to Duluth, 77 miles, 0.0078 cent; Menominee to Escanaba, 50 miles, 0.0080 cent; Soudan to Two Harbors, 73 miles, 0.0082 cent; Gogebic to Ashland, 45 miles, 0.0088 cent, and Marquette range to Marquette, 25 miles, 0.0128 cent. These figures contain no allowance for the proposed dock charge on ore from Michigan and Wisconsin mines. It will be noted that the highest rate of all is that for the shortest haul—from the Marquette range to Marquette—while the lowest rate is for the longest haul—from the Mesabi to Superior.

However, it is unfair to base comparisons on comparative distances, because a large amount of the expense of moving ore is terminal expense, which is practically a fixed amount, regardless of the length of haul. By terminal expense is meant the switching at the mines and the cost of maintenance and operation of the docks at the water end of the route. On one upper Michigan railroad the terminal expense amounts to from 40 to 50 per cent of the total cost of transportation, and it is practically the same whether a large or a small amount of ore is moved. The Mesabi haul is longer and there are more and longer trains operated, because of which the terminal expense makes a smaller hole in the total earnings than on a shorter and less busy road.

Stock Piles Growing

Stock piles on the Mesabi range continue to grow as mining interests look for heavy shipments during 1913. The prevailing impression in the Hibbing district is that shipments from the Lake Superior region will probably reach 50,000,000 tons.

The only drawback at present is the troublesome shortage of labor, but all underground mines are being worked as near to capacity as possible, and larger stock piles will be the rule all over the range.

In the Hibbing district, the underground mines of the Steel Corporation are being worked actively and especially the properties under the lease from the Great Northern Ore Co. west of the town. Heavy shipments from those mines are expected and it is probable that the Sellers mine, which has been closed for the past year on account of injunction proceedings, will rejoin the active producing class. The Morris mine east of Hibbing also will probably be a producer after a shut down of equal duration. The Buffalo and Susquehanna mines of Rogers, Brown & Co., and the Scranton mine of Pickands, Mather & Co., as well as the Webb mine of the Shenango Furnace Co., are being subjected to active preparations for a heavy shipping season.

The Monroe mine in the Chisholm district of the Mesabi range, which has not been a shipper for several seasons, will probably send forward considerable ore this year. Two steam shovels are now removing the over-burden from the open pit part of the mine in preparation. Independents in the Chisholm district are also very active and it is probable that the Shenango mine, owned by the Shenango Furnace Co., will be a heavy shipper in 1913.

Extending to the Menominee

The Cleveland-Cliffs Iron Co., which is one of the very largest of the independents, is preparing to engage in mining on the Menominee range. Except that it operates the Crosby property, on the Mesabi, and until a few months ago the Ashland, on the Gogebic, this company has confined itself to the Marquette district, in which it is the largest producer. Its Menominee department has been put in charge of John M. Bush, recently superintendent of the Ashland. The Cleveland-Cliffs has under option a number of tracts in the Iron River and Crystal Falls fields, and in at least one case, it is understood, sufficient ore has already been found to warrant the development of a mine. Exploration of the Cleveland-Cliffs lands is in progress. The Duluth Diamond Drilling Co., one of the most recent new comers in the Iron River country, is operating at the McDonald forty, in Section 6, 42-34. The property is south of the Corrigan, McKinney & Co.'s Baker tract. Capt. John T. Spencer, of the Iron Mountain, and associates are exploring the Greenhoot tract, south of the Zimmerman mine. At the new Bengal property of Pickands, Mather & Co., the shaft is down to the second level and drifting in two directions is in progress. A steel head frame and an engine house are being erected.

The Cleveland-Cliffs company's Lake mine at Ishpeming is now employing nearly 500 men on two shifts, the largest force in several years. Mining is being pushed vigorously and the stockpiles at the shafts will be of large proportions on April 1, notwithstanding part of the product is being sent to Marquette for storage. The Lake is a great mine, and is popular with miners, both in respect to safety and remuneration. With its income, derived from royalties obtained from the Cleveland-Cliffs company, the Escanaba River Land & Iron Co. has paid its stockholders dividends of 51 cents a share, a total of $20,400, on the returns from the last year's operations. The mine is in the Gwinn district of the Marquette range.

The Graham mine of the Steel Corporation on the eastern end of the Mesabi range is being stripped and prospects for active work during the coming season are good.

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Not a Private Controversy

When two men strictly in private life make charges against each other, the public has no interest whatever in the controversy, but the charges made by William J. Burns, a detective of national reputation, in an address before the Cleveland Chamber of Commerce, on Tuesday of last week, against the National Erectors' Association and its commissioner, Walter Drew, are not a private matter. The National Erectors' Association is an organization of erectors of structural steel material and is actively connected with the steel industry. The association has been prominently before the country for years, especially during the time when the dynamiting cases were pending. It has been known as the leading influence in bringing the dynamiters to justice. If, however, the charges made by Mr. Burns are true, it has impeded justice and prevented the conviction of at least some of those higher up among the union officials.

Mr. Burns had made a statement to the New York representative of THE IRON TRADE REVIEW, which we are publishing elsewhere in this issue, although it involves some matters which we believe have nothing to do with the controversy. In this statement, Mr. Burns says, "I have no fight whatever with the National Erectors' Association; on the other hand, the individuals of the National Erectors' Association have treated me considerately always, and one of the firms in that association is responsible for my investigation of the McNamara case, and that is the McClintic-Marshall Construction Co."

Mr. Burns, in his Chamber of Commerce speech, did give the McClintic-Marshall Construction Co. credit for supporting him, but he also complained of lack of support by the National Erectors' Association and declared that others would have been convicted, had it not been for that lack of support. He also made charges against the commissioner of that Association, Mr. Drew. The question is—Does the National Erectors' Association intend to support Mr. Drew and defend him against the charges? If not, what does it intend to do? Does it feel that it can afford to rest without doing anything, and dismiss the controversy as being unworthy of its notice? Mr. Drew has made a brief statement to the New York representative of THE IRON TRADE REVIEW.

"I have given THE IRON TRADE REVIEW the names of those who are officially connected with the case and know all the facts," said Mr. Drew. "They are the real and proper sources of information and no one else has the license to talk about the case publicly. The men to whom I refer are United States Attorney General Wickersham, United States Attorney Chas. W. Miller, of Los Angeles; Prosecuting Attorney J. D. Fredericks, and Oscar Lawler, Special United States Attorney in the Los Angeles cases. I do not care to engage in any public discussion of this matter with Mr. Burns at this time. When the time comes for me to say something, I may do so. Any public discussion cannot but do injury to the whole general cause."

We think it will be entirely proper to call as witnesses the government officials and others mentioned by Mr. Drew. We are, however, unable to see why anyone else who knows anything about the facts is not at liberty to talk about the case, if he believes it is his duty to do so.

Whether Mr. Burns and Mr. Drew proceed in the orderly fashion which we believe ought to be adopted to get at the facts in this controversy, or not, they will be tried before the bar of public opinion. Their future usefulness will be greatly affected by the decision of the public in this matter.

Labor Agitation in Japan

Labor agitation, extended to far-distant Japan, threatens to interfere with the progress of that wonderful country. In an article on "Japan's Commercial Crisis", James Davenport Whelpley, in the current issue of the *Century Magazine*, points out the very serious problems now confronting the island empire, which has made such great progress during the past few years. He says that the industrial situation in Japan is most critical and that the next few years will witness many disturbances preceding important and inevitable readjustments. The workman, heretofore

docile and obedient, has become restless and dissatisfied, owing to the dissemination of western ideas and the increasing cost of living. Although the western labor union as such is unknown, all labor in Japan is organized into guilds, which have absolute control of their members. Factory conditions in Japan are thoroughly bad. Japanese laborers do not have the nerve to strike in the ordinary way, but fail to appear for work and plead physical illness. The average of wages in Japan on 30 common occupations is 50 cents a day without food, and 40 cents a day with food. There is considerable agitation for a six-day week instead of a seven-day week, and demands familiar to us in the United States are being made for various and numerous reforms. While wages are low, the producing power of the Japanese labor unit is also very low, and Mr. Whelpley states that many employers are convinced that even with the wage scale as it is, Japanese labor is as well paid as that of England, Germany or the United States. He says that the Japanese workman is slow and inefficient and lacks initiative, energy and trustworthiness, and as the demand for higher wages becomes increasingly insistent, the employer faces a rise in the cost of production, of which the wage scale is not truly indicative.

Evidently the "yellow peril" is not much of a peril after all. "The modernization of industrial Japan," says Mr. Whelpley, "will take some time even at the present rate of progress, and until that is accomplished, there will be a large and profitable trade for western manufacturers of machinery and other things necessary to bring this about. Japanese competition in the higher civilized countries of the world need present no fears to western peoples."

Pig Iron Statistics

The production of pig iron in the United States in 1912 is officially reported as 29,727,137 gross tons. The statistics were gathered by the Bureau of Statistics of the American Iron and Steel Institute, this being the old organization of the American Iron and Steel Association under a new name, as the American Iron and Steel Institute absorbed the office as of Jan. 1, 1913.

The production of pig iron in the second half of the year, outside of charcoal iron, which amounted to 180,659 tons, is officially reported as 15,474,204 tons, while the monthly reports of THE IRON TRADE REVIEW, the December report being printed Jan. 9, showed 15,447,683 tons, making a difference of only 26,521 tons, which, being a difference of only one-sixth of one per cent, is entirely negligible.

As frequently occurs in the iron industry, with its great ups and downs, statistics published only a month after a stated period fail entirely to represent the condition of the industry at the moment. Statistically, it is of interest to know that the production in 1912, 29,727,137 tons, showed an increase of 25.6 per cent over the preceding year and of 8.9 per cent over the previous record year, 1910, but practically this fact sinks into insignificance considering that we are now making pig iron at the rate of more than 33,000,000 tons a year, which, if continued for a year, would mean a gain of more than 20 per cent over 1910. It is true that a rate of production reached does not mean a rate maintained for a twelvemonth. It has also proved the case that a high rate maintained for a twelvemonth may not produce a high calendar year record, for while 25,800,000 tons was produced in 1909, and 27,300,000 tons in 1910, the production in the twelvemonth, July 1, 1909, to July 1, 1910, was no less than 29,751,863 tons, which was slightly more than the production in the calendar year 1912. A new record for 12 consecutive months was not made in 1912, but such a record has undoubtedly been made for the twelvemonth ended Jan. 31, since the production last month greatly exceeded that in January, 1912. The production in the last 12 months has exceeded 30,000,000 tons by a comfortable margin.

Even a production of 33,000,000 tons of pig iron in 1913, which will easily be attained unless the industry has a serious setback in the second half, the prospects for the first half being already assured, will not be a remarkable performance considering the gains which have been made in the past. From the early times through 1906, pig iron production in the United States doubled every decade, usually with a little margin to spare, but a continuance of such a rate, beyond the 25,307,191 tons produced in 1906, would involve a production of slightly more than 40,000,000 tons in 1913.

The stability of the iron trade, of course, rests upon demand relative to capacity, and in this lies the strength of the present situation, for a practically full employment of the blast furnace capacity, which is economically fit to operate under conditions of moderately low prices, such as those now ruling, is involved in an output of about 34,000,000 tons, or not over 35,000,000 tons at the very outside. Thus the industry has practically full employment, even though it is making a much smaller tonnage than the precedents would indicate. In a sense, the industry is now undersized. It has not required as good general industrial conditions to engage its capacity, as has been the case in the past.

From this viewpoint, the fact that the iron industry has fully recovered from the setback of 1908 is by no means surprising. The key lies in the fact that it has not increased its capacity in the past few years as it was doing in practically all the past. In 1908, there was a large excess of capacity and the remembrance of that fact has probably retarded new construction. Given ordinarily good business conditions, the iron trade should find full employment, even though it increases its capacity during the next few years at a fairly rapid rate.

Judge Gary First Steel Corporation Witness

In Dissolution Suit—Following a Short Session, Hearings Adjourned Until Feb. 10, When Government Will Probably Announce It Has Finished

Following a short session last Thursday afternoon, the hearings in the suit of the government for the dissolution of the United States Steel Corporation were adjourned until Feb. 10. On that date, the opposing counsel in the case will hold a conference and it is believed that the government will then announce that it has finished putting in its evidence. If the government, therefore, decides to examine no more witnesses, the counsel for the defense will commence preparations for its own series of hearings which, according to present plans, will begin some time in April.

The record of testimony so far submitted amounts to about 1,260,000 words, while about the same quantity has been filed in the form of exhibits. This is an unusually small record for a case of this magnitude, especially since the hearings, not counting the various adjournments from time to time, have taken 42 days. It is expected that the examination of witnesses for the defense will be completed before the end of June and that the resultant contribution to the record will be even less voluminous than the portion already entered.

Defense's Testimony

Much speculation has taken place as to the nature of the testimony which the defense will offer in this case. From the conduct of the Steel Corporation counsel in the cross-examination of government witnesses, however, it is safe to predict that much stress will be laid on the fact that the efforts of the Steel Corporation toward promoting harmonious co-operation in the iron and steel industry have been attended by a constant growth on the part of independent steel companies, resulting in a continual decrease in the percentage of the total output controlled by the Corporation.

The first witness for the defense is to by Judge Gary, and so detailed will be his examination that it is expected he will occupy the stand for the greater part of a week. Judge Gary will be asked to tell of the policies which have been followed by the Steel Corporation beginning with 1901 and up to the present, and to tell what the effects of these policies have been. He will also be questioned regarding events which led up to the formation of the Steel Corporation as well as the formation of its various subsidiaries in the years prior to 1901. Judge Gary's testimony, in fact, is expected to be a sort of resume of the history of the entire iron and steel industry during the last two decades.

The hearings on Wednesday and Thursday of last week were devoted to further testimony by P. H. Nelson and to the examinations of William G. Gray and L. V. Hubbard.

P. H. Nelson was recalled to the stand on Wednesday for cross-examination by Frederick R. Kellogg, counsel for the Great Northern Ore trustees. Mr. Kellogg wanted to know on what Mr. Nelson had based his statement that the average royalty prevailing at the time that the Hill leases were effected was about 40 or 45 cents per ton. The witness substantiated his assertion by recalling several ore properties, such as the Leetonia, Morton, part of the Lewis property, the Canisteo, the Wyman and other leases which were made from 1904 to 1906 and 1907 at royalties ranging from 25 cents to 50 cents. Mr. Nelson, asked to tell about leases of a later date, mentioned several which were made in 1909 and 1910 at royalties of $1.25 and $1.35. These included the Virginia, Eveleth and others. The higher royalties which ruled after 1907, Mr. Nelson ascribed to the precedent established by the Hill lease, and to the fact that less ore land was available after that lease was made.

Prof. J. S. Grasty's Geography

During the examination of Prof. J. S. Grasty, of the department of geology of the University of Virginia, who was called in as an iron ore expert by the government attorneys, the professor, in addition to being badly misinformed in regard to the geography of the Lake Superior district, as reported in last week's issue of THE IRON TRADE REVIEW, *was equally at sea in respect to the location of Gary, Ind. He knew it was on some lake, he said, but whether Lake Superior, Lake Erie or Lake Ontario he could not tell.*

"Are you a Baptist, professor?" queried Judge Dickinson.

"No," replied the professor.

"Well, you will never get to heaven by the water route," declared Judge Dickinson.

Earlier in the examination Prof. Grasty had stated that "Lake Superior runs into Lake Ontario."

Henry E. Colton, of government counsel, who thereupon took the witness in hand for redirect examination, read a copy of a brief complaining against the method of taxation on iron ore property adopted by the Minnesota tax commission. This brief was presented in the Minnesota house of representatives by the delegation from St. Louis county. It was signed by Chester A. Congdon and others. In the brief the Hill ore leases were referred to as being "not an ore base but a deal in high finance", and it was stated that the real rates of royalty ruling on the Mesabi range at the time were not those specified in the Hill leases, but were more correctly represented by the rates paid by the Oliver Iron Mining Co. These, according to the sworn statement contained in the brief, averaged 27.2476 cents for the years 1902-1908, inclusive. Mr. Colton asked the witness if Mr. Congdon had ever been an employe or representative of the Steel Corporation, but this Mr. Nelson did not know.

Coleraine Plant

Mr. Colton asked the witness to state the names of the men who first established the ore washing plant at Coleraine. These Mr. Nelson did not remember. One of them, he said, was a young man who had previously been connected with the Minnesota Iron Co. After the failure of the enterprise at Coleraine this man left that section of the country; later the plant was taken over by the Steel Corporation.

Mr. Colton mentioned the name of Richard F. Grant and wanted to know if the witness knew him. Mr. Grant, said Mr. Nelson, is connected with the firm of M. A. Hanna & Co. The reason for Mr. Colton's inquiry did not develop.

Just before the signing of the Hill leases, said Mr. Nelson, there was a lull in the ore business in the Lake Superior district. Following the signing of the leases, activity developed immediately.

Mr. Colton asked the witness whether the Steel Corporation is making any special effort to take out as much ore as possible before the expiration of the leases.

"My impression," said Mr. Nelson, "is

that they are taking out every ton they can."

"Are they selecting the best grades of ore or do they take it as it comes along?"

"Why, I suppose they are taking the cream—that would be sound business judgment," said the witness.

"What advantages has the Steel Corporation over its competitors?" asked Mr. Colton.

"I object," interposed Mr. Reed, of counsel for the defense, "as that question covers nearly the whole of the litigation."

Mr. Nelson then stated that the Steel Corporation's advantages lay in the ownership of better mines and in the possession of transportation facilities. It also had some less important advantages.

William G. Gray, chief of the bureau of statistics of the American Iron and Steel Institute was then called to the stand. He was asked by Mr. Colton to state when he first heard that the American Iron and Steel Association was to be taken over by the American Iron and Steel Institute. He first learned of the proposed step, he said, in May of 1912.

Mr. Colton wanted first to know whether, now that this change has occurred, the statistics will be gathered in the future in the same manner as they have been made up in the past.

"They will be," replied Mr. Gray.

Mr. Colton then asked the witness to produce a table showing the production of all kinds of pig iron, by grades, for the Steel Corporation and the independent furnaces respectively, beginning with the year 1901. At the bottom of this table was a note stating that while the Steel Corporation formerly sold 15 per cent of its output of ferro-manganese to other consumers, it now, owing to the difficulty in obtaining suitable ore, consumes 98 per cent of its own output. The note went on to state that though the output of manganese ore in this country in 1910 was 2,258 tons, the imports amounted to 242,348 tons. Mr. Colton, believing that this statement would injure the government's contention that the Steel Corporation enjoys a monopoly of the production of ferro-manganese in this country, crossed out the note, asking Mr. Gray in a slightly reproving way if he had requested him to produce anything outside of the pig iron production tables.

"You told me to get the facts, that you were after facts, whether they operated for or against the government, so I followed your instructions and here are the facts," said Mr. Gray pointing to the table.

Mr. Gray's data on ferro-manganese will be introduced in evidence by counsel for the defense at a later date.

L. V. Hubbard, of the law firm of Noble, Jackson & Hubbard, New York, which disbanded last April, was called to the stand on Thursday.

"Did you know anything of the various pools with which your partner, E. E. Jackson, was associated?" asked H. E. Colton, of counsel for the government.

"Yes, sir."

"Was he connected with the Horseshoe Association?"

"He was supervisor of that association."

"Where is E. E. Jackson now?"

"In Europe."

"Could you locate the records and minutes of the Horseshoe Association?"

"No sir, they were destroyed."

"None of them were saved?"

"No sir. It was always our custom to destroy our documents after they had lost their usefulness."

"Is there anyone you could name who is better acquainted with the affairs of the Horseshoe association than Samuel J. Bailey, who was formerly employed in your office and who has already been on the stand as a witness in this case?"

"No, sir. Mr. Bailey is better informed regarding the Horseshoe association than any other man."

"That is all," said Mr. Colton, and as counsel for the defense waived the cross-examination, the witness was excused, subject to another call in the future.

Thursday morning the government introduced into the record a document purporting to be a copy of the old "wire pool" agreement, dated Jan. 5, 1899. It was signed by John W. Gates and Isaac L. Ellwood, as parties of the first part, and Frederick P. Voorhees, as party of the second part. This copy was filed in lieu of the original which is not now in existance. This document was obtained from Frederick Strauss, of the banking firm, J. & W. Seligman & Co., New York.

Another New Shipper

Another addition to the list of shippers during the coming year will probably be the Judd mine on the western end of the Mesabi range. This is a Steel Corporation property and is included in the Canisteo district. Active preparations are being made for heavy shipments from all of the Hill-leased mines.

Semi-Annual Meeting.—The National Machine Tool Builders' Association will hold its semi-annual meeting at the Hotel Astor, New York City, on Thursday and Friday, May 15 and 16.

ON BASIS OF JUSTICE

Cleveland Employers' Association Would Establish Industry.

The Cleveland Employers' Association has changed its name to the Industrial Association of Cleveland, and has made important changes in its constitution. Article II of the constitution now reads in part as follows:

This association is formed for the purpose of assisting in the establishment of industry upon a basis of justice and to aid in securing and maintaining industrial conditions which shall be just to and promote the welfare of all concerned, and worthy the ideals of city and state. We favor and pledge our support to all proper measures and legislation, national, state and civic, tending to protect and safeguard the life and health of all employes and to promote their safety and welfare.

In framing all such legislation, regard should be had and care and judgment exercised that our present industrial prosperity be not destroyed by placing the industries of Ohio at a disadvantage in competition with other states, through the creation and imposition of unjust or unwarranted burdens.

It is therefore our purpose to assist in all proper ways in the enactment of constructive legislation looking toward the scientific regulation of working conditions.

The new officers of the association are: C. O. Bartlett, president; Richard A. Feiss, first vice president; J. G. Jennings, second vice president; C. O. Bassett, treasurer, and Edward J. Hobday, secretary and general counsel.

Increasing Use of By-Product Coke

Fenwick C. Atwill, president of the Atwill-Makemson Coal & Coke Co., Chicago, delivered an address Jan. 28 before the Chicago Coal Dealers' Association, in which he said in part:

"The volume of by-product coke has increased vastly in the past few years and for reasons which have been outlined is going to increase vastly each year. The output in 1911 was 7,847,854 tons with 4,624 by-product ovens in existence. There was a big increase both in production and number of ovens in 1912 and unless my prophetic sense has gone awry, there will be a greater increase in 1913 and in each succeeding year.

"A battery of by-product ovens is not an inexpensive thing to create; hard-headed business men do not go into that business just for the fun of it. They are supplying a very definite need and they are supplying an increasing need. They are supplying a need for cheaper gas in cities; a need for tar in manifold lines of industry; a need for ammonium sulphate in farming, and a need for smokeless fuel in large cities, to say nothing of the need for a vastly increased tonnage of coke in the metallurgical industry."

MEN OF THE IRON TRADE

R. P. Hutchinson has resigned as specialty salesman for the Carnegie Steel Co., in the Cleveland district and has been elected president and general manager of the Guerber Engineering Co., Bethlehem, Pa., a company which is in the general structural fabricating business and also railroad frog, crossing, and specially work. Mr. Hutchinson graduated from Lehigh University in 1904 and entered the employ of the Carnegie Steel Co., at the Duquesne works, in June, 1904. He worked through several departments, and in January, 1906, went into the metallurgical department, where he remained until 1907, and was then transferred to the sales department in the Philadelphia office. He was transferred to the Cleveland sales office, December, 1909, and for the past year and a half has had charge of the specialty sales for the Cleveland office.

A. M. Sawin has been elected president of the Anderson Wire & Steel Co., Anderson, Ind., succeeding A. C. Shimer, resigned.

J. L. Keck, Connellsville, Pa., has been appointed foreman of the mine of the Crucible Steel Co. of America, Pittsburgh, at Crucible, Pa.

Charles Burgess, president of the Cyclops Steel Works, Titusville, Pa., has left for California, where he will spend the remainder of the winter.

Herbert Dupuy, chairman of the board of the Crucible Steel Co. of America, Pittsburgh, expects to sail for Europe the early part of this month.

John C. Oliver, a Pittsburgh iron and steel manufacturer, who was operated upon, Jan. 27, at Johns Hopkins hospital, Baltimore, Md., is improving.

Milton O. Knauss has resigned as superintendent of the Macungie, Pa., furnace of the Empire Steel & Iron Co. and has been succeeded by John Thomas.

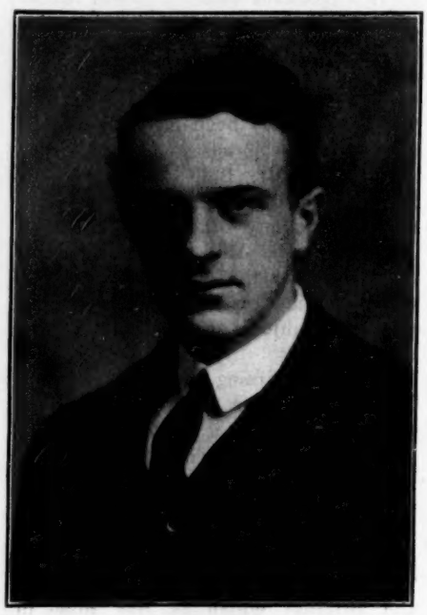
Dr. Joseph W. Richards, of Lehigh University, will read a paper in Pittsburgh on electric furnace practice, after his return from a vacation trip to Jamaica.

R. M. Hawkins Jr., who was formerly associated with the Standard Welding Co., Cleveland, has accepted the position of eastern representative of the Hill Clutch Co., Cleveland. He will be associated with its New York sales office, at 50 Church street.

Michael H. Fallon, Joseph Mackey, Joseph P. Carroll and James H. Fallon have been elected directors of the Reynolds-Chalou Foundry Co., Troy, N. Y.

David Evans, president of the Chicago Steel Foundry Co., left last week for Panama. Mr. Evans' family accompanied and they will be gone about four weeks.

Frank Pund has been elected vice president of the D. T. Williams Valve Co., Cincinnati, succeeding the late D. M. Forker. Mr. Pund was formerly



R. P. HUTCHINSON

associated with the Republic Iron & Steel Co., Youngstown, O. Other officers of the company were re-elected.

Atlee Wilson, an assistant master mechanic of the Youngstown Sheet & Tube Co., Youngstown, O., has resigned to become identified with the Brier Hill Steel Co., that city.

J. G. Garrard has resigned from the Griffin Wheel Works, Chicago, to accept the position of superintendent of the plant of the Northwestern Malleable Iron Co., Milwaukee, Wis.

Dr. H. R. de Holl, who has been assistant superintendent of the by-product plant of the Tennessee Coal, Iron & Railroad Co., at Corey, Ala., has taken up his duties as superintendent of the by-product ovens of the Inland Steel Co., Chicago.

Adam Schantz, William Kette, William Dennick, C. W. Bieser, R. M. Pine, Russell Wells and C. B. Ozias have been chosen directors of the Dayton Iron & Steel Co., Dayton, O.

W. O. Rankin, Pittsburgh, who superintendended the construction of the Tata Iron Works in India, spoke before members of the Presbyterian Men's League at New Castle, Pa., last week.

C. E. Watson, former master mechanic of the Pittsburgh Crucible Steel Co., at Midland, Pa., has resigned. He was with the National Tube Co. for several years.

Max Klar, who has been engaged in installing retort systems of wood distillation for chemical plants in northern Michigan for the past three years, returned to Germany Feb. 4.

C. E. Postlethwaite, of the Pressed Steel Car Co., Pittsburgh, and F. D. Newbury, of the Westinghouse Electric & Mfg. Co., of that city, are new members of the Franklin Institute, Philadelphia.

Fred Fox has been appointed accident inspector at the Sharon, Pa., plant of the Carnegie Steel Co. Samuel Haywood has succeeded Mr. Fox as assistant secretary to Superintendent F. E. Norris.

J. M. Manley, who recently resigned as secretary-treasurer of the Hisey-Wolf Machine Co., Cincinnati, has taken a position as city representative of Weil, Roth & Co., brokers, also of Cincinnati.

C. H. Billings has been elected president of the Lambert Machinery Co., Marshall, Mich., to succeed W. H. Arthur, who recently accepted a position as secretary of a motor car radiator company in Detroit.

M. J. Madison recently went from Chicago to Cincinnati to become superintendent of the plant of the Weir Frog Co., that city. He was formerly assistant superintendent of the Morden Frog & Crossing Co.

George S. Comstock has been elected president of the Engineers' Society of Pennsylvania, Harrisburg, for the ensuing year. The other officers chosen are as follows: Farley Gannett, first vice president; John Price

MEN OF THE IRON TRADE

Jackson, second vice president; Edward R. Dasher, secretary; R. Boone Abbott, treasurer; F. E. Langenheim and C. P. Turner, resident directors, and Albert F. Damon, non-resident director.

J. W. Bass, foundry expert employed by the Globe Malleable Iron & Steel Co., Syracuse, N. Y., has resigned and has accepted the position of foundry superintendent of the Oneida Foundry Co., Oneida, N. Y.

Isaac A. Brown, for 20 years superintendent of labor and transportation at the Ohio works of the Carnegie Steel Co., has resigned because of ill-health and retired Feb. 1. No successor to Mr. Brown has yet been chosen.

Frank M. Henderson, cashier of the Bridgeport National Bank, Bridgeport, O., has been appointed treasurer of the Wheeling Sheet & Tin Plate Co., Wheeling, W. Va., and will assume his new duties on March 1.

E. W. Edwards, president of the Edwards Mfg. Co., Cincinnati, manufacturer of sheet and metal ceilings, has returned from a combined vacation and business trip through the south. Mr. Edwards spent some time at Palm Beach, Fla.

Fred H. Daniels, chief engineer of the Worcester, Mass., plants of the American Steel & Wire Co., has gone to the Panama canal zone for the benefit of his health. He recently underwent a serious operation in Johns Hopkins hospital, Baltimore, Md.

Wm. L. Saunders, president of the Ingersoll-Rand Co., New York, has been elected president of the International Harvester Corporation, recently chartered in New Jersey, to carry on certain branches of the business of the International Harvester Co.

E. L. Gingrich, for the past 10 years assistant manager of the Hamilton Otto Coke Co., Hamilton, O., is now associated with the Atwill-Makemson Coal & Coke Co., McCormick building, Chicago, and has charge of the traffic department and supervision over the details of coke shipments.

Harry S. Matthews, Birmingham, Ala., former president of the Alabama Consolidated Coal & Iron Co., has become connected with the International Steel Corporation in the capacity of vice president and general manager, and will leave shortly for his new headquarters in Seattle, Wash.

Lysle I. Abbott has been elected president of the Omaha Safe & Iron Works, Omaha, Neb.; Ray W. Vierling was chosen vice president and manager; L. V. Schiebel, treasurer; C. A. Isaakson, secretary. The board of directors elected includes K. L. Vierling, C. V. Bixby, and L. V. Heinscheimer.

George H. Neilson, general manager of the Braeburn Steel Co., John A. Brashear, astronomer and scientist, both of whom reside in Pittsburgh, and J. C. Cromwell, of the Garrett-Cromwell Engineering Co., Cleveland, spoke before members of the University of Illinois Alumni Association of Pittsburgh, at its recent meeting.

Ralph D. Mershon, president of the American Institute of Electrical Engineers, will be the guest of honor at the seventh annual banquet of the Pittsburgh section of the society, to be held in that city Feb. 8. H. E. Longwell, consulting engineer of the Westinghouse Electric & Mfg. Co., will be toastmaster.

Harvey P. Daugherty has been elected president and treasurer of the Iron City Foundry Co., Lebanon, Pa. Other officers elected at the recent annual meeting were: G. Earl Daugherty, vice president; Frank H. Lehman, secretary and solicitor. The board of directors includes the officers and J. Wert Reber.

C. L. Baker, formerly chief clerk of the Neville and Edith blast furnaces of the Carnegie Steel Co., has resigned his position as chief clerk of the Pittsburgh warehouse of the same company and has accepted a position as assistant to H. W. McAteer, comptroller of the Cambria Steel Co., Johnstown, Pa., taking effect Feb. 1.

E. A. Peden was chosen president at the annual meeting of the directors and stockholders of the Peden Iron & Steel Co., Houston, Tex., held recently. D. D. Peden Jr. was elected vice president and treasurer; John A. Harvin, vice president and manager; Charles D. Golding, vice president; R. C. Terrell, secretary and sales manager; J. O. Buford, manager supply department. Additions are being made to the warehouse of the company at Houston and San Antonio, Tex.

Senator Chester D. Sensenich, Westmoreland, president of the Irwin Foundry & Mine Car Co., Irwin, Pa., was named a member of the appropriations, elections, judiciary special, law and order library, mines and mining, and chairman of the public grounds and building committees, of the Pennsylvania state legislature.

W. W. Shilling, J. E. Wood, Robert McIntyre, Joseph Riddell, Thomas Kennedy, H. P. Forker, James H. Whitla, William A. Wallis and George L. Collard have been elected to the directorate of the Sharon Foundry Co., Sharon, Pa. Mr. Shilling and Mr. Kennedy were re-elected president and secretary and treasurer, respectively.

W. N. Donaldson, superintendent of transportation and labor at the Brier Hill Steel Co., Youngstown, O., for the past year, has resigned and to accept a similar position with the Ohio works of the Carnegie Steel Co., at Youngstown, succeeding Isaac O. Brown, resigned. Mr. Donaldson was formerly Mr. Brown's assistant at the Ohio Works.

L. A. Johnson was elected president of the Fulton Machine & Vise Co., Lowville, N. Y., at the recent annual meeting of the stockholders. Other officers elected were: A. E. Gebbie, vice president; E. W. Fulton, treasurer and general manager; W. J. Yousey, secretary. The board of directors elected includes L. A. Johnson, A. E. Gebbie, E. W. Fulton, James Nefsey and William Mattson.

W. K. Schoepf, president of the Cincinnati Traction Co., Cincinnati, succeeded Harry C. Ebert as president of the Cincinnati Car Co. W. H. McAllister, comptroller of the Cincinnati Traction Co., has been elected vice president of the Cincinnati Car Co. Mr. Ebert will be retained as sales manager, as he retired from the presidency in order to devote all of his time to this end of the business.

Guilford Duncan was elected president of the Ludlow-Saylor Wire Co., at the recent annual meeting of the stockholders in St. Louis. Frank Low and E. J. Gould were elected vice presidents; D. I. Meier, secretary

MEN OF THE IRON TRADE

and treasurer; William Duncan, chairman of the advisory board. Directors elected were: C. L. Dean, H. M. Meier, Guilford Duncan, Frank Low, Leslie Dona and E. J. Gould.

H. H. Hughes, former Pittsburgh representative of the Johns-Manville Co., New York, on Feb. 1, succeeded S. H. Wheelhouse, manager of sales in the Pittsburgh district for the Hooven, Owens & Rentschler Co., Hamilton, O., manufacturer of Hamilton Corliss engines. Mr. Wheelhouse has accepted the position as manager of sales for the Buckeye Engine Co., with headquarters in Salem, O.

Charles E. Faeth, of the Faeth Iron Co., Kansas City, Mo., is president of the American Iron, Steel and Heavy Hardware Association, which will hold its convention in Buffalo, June 10, 11 and 12. Other officers of the society are: C. M. Roehm, Roehm & Davidson, Detroit, Mich., first vice president; E. W. A. Waterhouse, Waterhouse & Lester Co., San Francisco, Cal., second vice president, and E. R. Yarnelle, New York, secretary and treasurer.

Malcolm McLeod, Chisholm; Michael Prisk, Ely; Elisha Morcom, Tower; R. Knight and Richard Trevarthen, Eveleth, and John Tressider, Coleraine, were the master mechanics of the Oliver Iron Mining Co., who met in Hibbing, Minn., last week to attend their annual meeting. Chief Engineer S. S. Rumsey and Assistant Chief Engineer A. M. Glow, Duluth, were also present at the meeting. Papers pertaining to the iron mining industry were read and discussed.

F. H. Begole has been elected president of the Lake Shore Engine Works, Marquette, Mich. At the recent meeting of the stockholders held in Marquette, other officers were elected as follows: J. M. Longyear, vice president; Morgan W. Jopling, treasurer; J. E. Call, secretary; E. L. Pearce, assistant secretary. The board of directors, all of whom were re-elected, includes F. H. Begole, J. M. Longyear, Morgan W. Jopling, J. E. Ball, E. L. Pearce, A. H. Palmer and J. E. Sherman.

Charles M. Wales, who, after leaving college, began work as a draftsman with the Cleveland City Forge & Iron Co., Cleveland, and later for a number of years represented that company in New York City, has resigned and has accepted the agency of the Otis Steel Co., Cleveland, for steel castings. Mr. Wales will also represent the Titusville Forge Co., Titusville, Pa., in selling hammered or pressed iron, open-hearth and nickel steel forgings. His offices are at 11 Broadway, New York.

R. Jay Walsh was elected president of Abendroth Bros., Port Chester, N. Y., at the annual meeting of the company held in that city, Jan. 28. Other officers of the company were chosen as follows: C. B. Elmer, vice president; A. R. Wilcox, treasurer; John W. Diehl, assistant treasurer; J. H. Ellis, comptroller; D. H. Roney, secretary. The following were chosen members of the board of directors: R. Jay Walsh, C. B. Elmer, Chas. Lanier, John W. Diehl, George Slater, D. H. Roney and A. R. Wilcox.

M. I. Arms was re-elected chairman of the board of directors of the General Fireproofing Co., Youngstown, O., at its annual meeting last week. Other officers, all re-elected, were chosen as follows: W. H. Foster, president; A. P. White and J. T. Harrington, vice presidents; F. K. Rhines, secretary and treasurer. The board of directors comprises M. I. Arms, W. H. Foster, A. P. White, J. T. Harrington, C. H. Booth, W. P. Arms and Henry Wick. It was voted to resume the paying of dividends and to issue $100,000 in preferred stock.

Richard P. Joy, at the recent annual meeting of the Detroit Bridge & Steel Works, Detroit, Mich., was elected president. Other officers elected were: R. B. Titsworth, vice president; Max J. L. Towler, vice president and general manager; Frederic W. Dennis, secretary and treasurer; Chas. A. McLees, assistant treasurer. Directors elected include: Henry D. Sheldon, Richard P. Joy, William P. Hamilton, Alexander McPherson, Max J. L. Towler, Charles A. McLees, Henry B. Joy, Frederic W. Dennis and R. B. Titsworth.

E. T. Adams, who for several years has been president of the Wisconsin Engine Co., Corliss, Wis., has resigned and accepted a position with M. Rumely & Co., Laporte, Ind., manufacturer of farm machinery, engines, threshers and other implements. This fact was brought out recently by the filing of a voluntary petition by the engine company for a composition with creditors without adjudication. Mr. Adams will have charge of the Rumely company's work in perfecting the kerosene gas engine, which type he first successfully developed at Corliss.

William Wilkoff, H. S. Stocker, John T. Harrington, J. W. Blackburn and F. Wilkoff, were elected directors of the Wilkoff Bros. Co., Youngstown, O., at the recent annual meeting of the stockholders. The directors elected the following officers: President and treasurer, William Wilkoff, vice president, John T. Harrington; secretary, H. S. Stocker. The National Enameling & Mfg. Co., a subsidiary of the Wilkoff Bros. Co., elected the same officers and directors with one exception. C. H. Allman, manager and superintendent, was named director in place of F. Wilkoff. The enameling company recently increased its capital from $25,000 to $100,000.

A. B. Mixsell, general sales agent of the Bethlehem Steel Co., was made the recipient of a handsome silver service by the district sales agents of the company at a complimentary dinner tendered him at the Lehigh Country Club, South Bethlehem, Pa., Friday evening, Jan. 24. On the night previous, President C. M. Schwab, of the Bethlehem Steel Corporation, gave his annual dinner to his superintendents and district sales agents, which had been postponed since the holidays because of Mr. Schwab's absence from this country. The dinner was given in the company's offices and about 85 attended.

John Price Jackson, dean of the school of engineering at the Pennsylvania State College, was elected president of an association formed at Washington, D. C., recently, embracing the engineering divisions of the land grant universities and colleges of the United States. The society will deal with problems peculiar to such institutions, and co-operate with the Agricultural Association which has been in active existence for years. P. P. Claxton, commissioner of education of the United States, was elected ex-officio vice president, and A. Marston, dean of the engineering division of the Iowa State College, was chosen secretary and treasurer.

OBITUARIES

Robert Sleeth, whose death was noted in THE IRON TRADE REVIEW of Jan. 30, was born in Ireland, June 15, 1827, and came to this country with his parents when yet a child, settling in Pittsburgh. He learned his trade as a molder in Mitchell's Foundry, then located on Pike street, near Eleventh street, and worked at his trade for many years at the Fort Pitt foundry. While employed there he molded the first cannons used in the civil war and the ornamental iron work on the steeple of St. Philomena's Catholic church, at Fourteenth and Liberty streets, Pittsburgh, and also the ornamental plates over the footpaths on the first Sixth street suspension bridge, which was torn down to erect the present structure. He was superintendent for a time at what was known as the Old Smith Foundry, at Twenty-third and Smallman streets, from which place he went as foreman of the foundry of Bollman, Boyd & Baggaley, at Twenty-fifth and Liberty streets, and retained this position until about 1870, when the firm of James B. Young & Co., as the Phoenix Roll Works, was organized, of which he became a partner. The business was then removed to the present location at Forty-first street and A. V. railroad, the Westinghouse Air Brake Co. having purchased the former site. After a number of changes in the personnel of the firm, it was, in 1896, incorporated as the Seaman-Sleeth Co., of which he was the vice president.

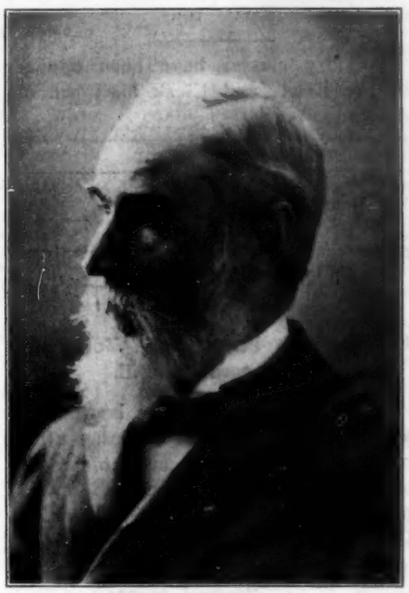
In late years, failing health prevented Mr. Sleeth from taking an active part in the business. He spent his winters in San Diego, Cal., where he died, Jan. 24, leaving to survive him three sons, William J. Sleeth and Robert L. Sleeth Jr., of Pittsburgh, and George C. Sleeth, of Welleville, N. J., and one daughter, Margaret A. Sleeth. He was a member of the United Presbyterian church and for years a trustee of the Sixth Church of Pittsburgh.

John C. Garner, one of the organizers of the Ashland Iron Works, Pottsville, Pa., died in that city Jan. 29. He was born in Pottsville in 1832 and was a veteran of the Civil war.

James B. Hammond, president of the Hammond Typewriter Co., died recently at St. Augustine, Fla., aged 74 years. Mr. Hammond had been in the south for his health for some months.

John R. Armstrong, former superintendent of the S. R. Moore & Sons Corporation, Elizabeth, N. J., died recently at that place at the age of 93. He was believed to be the oldest resident of Elizabeth.

George D. Smith, general superintendent of the Canadian Steel Foundries, Ltd., Montreal, Que., died suddenly in that city on Jan. 30. He had been affected with heart trouble for a number of years, though he was able to be down at the offices of the company on the Monday previous. He had been connected with the Canadian Steel Foundries, Ltd., since 1889.



ROBERT SLEETH

Josiah Barrett, 66 years old, an inventor, and one of the founders of the Duff Mfg. Co., Pittsburgh, died suddenly at Jacksonville, Fla., Jan. 28. He was born in Harrisburg, Pa., Feb. 20, 1846, a son of Oramal Barrett, the first editor of the Pittsburgh *Post*. Going to Pittsburgh shortly after the civil war, Mr. Barrett learned the machinist trade at the Pittsburgh Locomotive Works. A few years later the Duff Mfg. Co. was organized. Mr. Barrett was the inventor of several valuable devices, including a lifting jack, an oil well wrenching jack, and a swivel wrench, all of which bear his name.

Hugh McCulley, for 40 years an employe of the Jones & Laughlin Steel Co., Pittsburgh, died recently at Greenville, S. C. Before he retired from the Jones & Laughlin Company, several years ago, he was superintendent of the machine and cold roll department. Mr. McCulley was especially well known in the Pittsburgh district.

George Harding, one of the founders of the Modern Steel Structural Co., Waukesha, Wis., and later founder of the Waukesha Malleable Iron Co., died recently after a long illness, aged 73 years. Mr. Harding was born in East Aurora, N. Y., on March 20, 1840, and his first business venture was a hardware store, which he established at Chippewa Falls, Wis., in 1869. In 1899, he moved to Waukesha and in 1900 was a moving spirit in the organization of the Modern Steel Structural Co. He served several terms as mayor of Waukesha, and held many other public offices. The site of the Waukesha Malleable Iron Works was given to the company by Mr. Harding from the acreage of his stock farm.

Stephen S. Palmer, chairman of the New Jersey Zinc Co., 55 Wall street, New York City and a director and officer in a large number of corporations, including principally zinc, copper and railroad interests, died Jan. 28, in Redlands, Cal., where he had been living recently for the benefit of his health. He was 60 years of age. Mr. Palmer had been prominent in the manufacture of zinc and its by-products, his company, the New Jersey Zinc Co., operating large works at Palmerton, Pa., which town was named in his honor. This company operates several blast furnaces at Palmerton, for the production of spiegeleisen. Mr. Palmer was also a director and member of the executive committee of the Lackawanna Steel Co., and president of the Harvey Steel Co., now liquidated. His son Edgar Palmer is now president of the New Jersey Zinc Co., having been elected last June.

OFFICIAL FIGURES

For 1912 Pig Iron Output Issued by Institute Bureau.

The bureau of statistics of the American Iron and Steel Institute has received from the manufacturers complete statistics of the production of all kinds of pig iron in the United States in 1912. Every furnace has been heard from. Detailed statistics will be found in the accompanying statement. The figures for the first half of 1912 were compiled by the American Iron and Steel Association and for the last half of the year by the bureau of statistics of the American Iron and Steel Institute.

Total Production

The total production of all kinds of pig iron in 1912 amounted to 29,727,137 gross tons, against 23,649,547 tons in 1911, an increase of 6,077,590 tons, or over 25.6 per cent. Several thousand tons of ferro-phosphorus, ferro-titanium, ferro-vanadium, and other alloys are included for both years. The following table gives the half-yearly production of all kinds of pig iron since 1908:

Periods.	1912.	1911.	1910.	1909.	1908.
First half	14,072,274	11,666,996	14,978,738	11,022,346	6,918,004
Second half	15,654,863	11,982,551	12,324,829	14,773,125	9,018,014
Total	29,727,137	23,649,547	27,303 567	25,795,471	15,936,018

The production in the second half of 1912 shows an increase of 1,582,589 tons, as compared with the production in the first half of that year.

Furnaces in Blast

The whole number of furnaces in blast on Dec. 31, 1912, was 313, against 266 on June 30, 1912, and 231 on Dec. 31, 1911. The number of furnaces idle on Dec. 31, 1912, including furnaces being rebuilt, was 153, against 200 on June 30, 1912, and 235 on Dec. 31, 1911.

During the last six months of 1912 the number of furnaces actually in blast during a part or the whole of the period was 337, against 302 in the first half of the year. In the last half of 1911, 275 furnaces were active, against 297 in the first half.

Furnaces Abandoned

In the last half of 1912 Tallapoosa furnace, at Tallapoosa, Ga., was abandoned. The furnace used charcoal for fuel when last in blast and had an annual capacity of 13,500 tons. During the first half of the year seven furnaces, with an annual capacity of 215,000 tons, were abandoned, all of which used mineral fuel when last in blast.

Furnaces Building

On Dec. 31, 1912, there were seven entirely new furnaces in course of construction, all of which will use mineral fuel, as follows: Pennsylvania, three; Virginia, one; Ohio one; and Minnesota, two. In addition one coke furnace in Virginia was partly erected but work has been suspended for several years.

Furnaces Rebuilding

On Dec. 31, 1912, eight old furnaces were being rebuilt, all mineral fuel, as follows: New Jersey, one; Pennsylvania, one; Maryland, one; Virginia, one; Alabama, one; and Ohio, three.

New Furnaces

During the six months of 1912 but one entirely new furnace was completed, namely, the charcoal furnace of the Stephenson Charcoal Iron Co., at Wells, Mich. It has an annual capacity of 20,000 tons.

Foundry classes have been opened in the Lewis and Clark high school, Spokane, Wash.

HOUSE COMMITTEE

Recommends Passage of Workmen's Compensation Bill.

Washington, Feb. 3.—The house committee on the judiciary, Saturday afternoon, voted to make a favorable report on the workman's compensation bill, passed by the senate at the last session. Dozens of amendments to the verbiage of the bill were made, but there was no change in the essential proposition that the injured man or his dependents shall sue for damages under this act or none at all. An amendment was agreed to providing that local courts shall have concurrent jurisdiction in such states as may pass state laws in conformity with the federal act.

Employes of express companies are also brought within the terms of the act, which, of course, applies only to those engaged in interstate commerce. A proposition to give the injured man or his dependents the option of suing under either this act or the common law, was defeated. For that reason, Floyd, of Arkansas; Houston, of Tennessee; Rucker, of Missouri; Beall, of Texas, and Webb, of North Carolina, voted against the measure.

MILWAUKEE EMPLOYERS

Organize Workman's Compensation Insurance Company.

Milwaukee, Feb. 4.—Milwaukee employers have organized the Workmen's Compensation Mutual Liability Insurance Co., to be better able to meet the demands of the industrial insurance act and withstand the increased liability rates made by the old line stock companies following the legislative enactment.

This is the second company of this kind organized in Wisconsin since the industrial insurance act went into effect. The first was organized at Wausau, Wis., and takes in most of the big lumbering and milling interests of the northern part of the state. The new Milwaukee company will give service principally for the employers in Milwaukee and suburbs.

"This form of insurance is strongly recommended by the Wisconsin Industrial Commission in its last official bulletin to employers of the state," said Julius E. Roehr, counsel for the company. "It relieves the employers from the increased rates made by the old line indemnity companies after the law went into effect."

Offices have been established in the Majestic building at Milwaukee, where the election of officers will be held on Jan. 30. The incorporators are: A. J. Lindemann, of the A. J. Lindemann-Hoverson Co., stove and range manufacturers; E. L. Philipp, Union Refrigerator Transit Co; Louis Hoffman, Hoffman & Bauer, galvanized iron works; J. W. Sutterle, Loeffelholz Co.; L. J. Mueller Jr., L. J. Mueller Furnace Co.; J. W. Utley, general contractor; Alonzo Pawling, P. E. Mueller, W. N. Fitzgerald, A. E. Martin, J. P. Hernsheim, Henry Wallschlaeger Jr., Roland B. Roehr, Edwin A. and William J. Piepenbrink, and Julius E. Roehr.

Improving Records

The Michigan State Tax Commission is making plans for a systematic and efficient maintenance of records of the size and value of ore bodies for the purpose of accurate taxation. Ore values are constantly changing, due to the finding of new deposits, removal of ore and fluctuation in the market price of the product. Undeveloped mineral lands also are being explored and their values determined. It is desired to have a geological staff constantly at work keeping all records up to date, rather than that the information should be left to be collected hurriedly in the few weeks' sitting of the Tax Commission. It is proposed to enlarge the duties of the geological department to include the collection and keeping of such statistics.

THE PRODUCTION OF PIG IRON IN THE UNITED STATES IN 1912.

Statistics collected from the Manufacturers by The American Iron and Steel Association for the First Six Months of 1912 and by the Bureau of Statistics of The American Iron and Steel Institute for the Last Six Months of 1912, all in Gross Tons of 2,240 pounds.

Production in the First Half of 1912, 14,072,274 Gross Tons; Second Half of 1912, 15,654,863 Tons; Whole of 1912, 29,727,137 Tons.

Total Production of All Kinds of Pig Iron.

TOTAL PRODUCTION OF PIG IRON BY STATES.

States.	Blast Furnaces. In blast June 30, 1912.	Blast Furnaces. December 31, 1912. In.	Out.	Total.	Production—Gross tons. (Includes spiegeleisen, ferro-manganese, ferro-silicon, ferro-phosphorus, etc.) First half of 1912.	Second half of 1912.	Total for 1912.
Massachusetts	1	2	0	2	8,793	8,573	17,366
Connecticut	3	3	0	3			
New York	17	19	10	29	880,581	1,058,650	1,939,231
New Jersey	1	1	6	7	2,773	34,103	36,876
Pennsylvania	108	128	35	163	6,035,773	6,516,186	12,551,959
Maryland	2	3	2	5	107,027	112,519	219,546
Virginia	6	7	18	25	120,127	136,040	256,167
Georgia	0	0	3	3			
Texas	0	0	4	4			
Alabama	19	25	24	49	887,512	975,397	1,862,909
West Virginia	2	3	1	4	129,155	145,205	274,360
Kentucky	1	3	5	8	24,017	44,743	68,760
Tennessee	9	7	12	19	145,076	193,162	338,238
Ohio	49	58	17	75	3,285,752	3,516,885	6,802,637
Illinois	20	22	4	26	1,304,227	1,583,132	2,887,359
Indiana	10	10	0	10	788,252	982,376	1,770,628
Michigan	10	12	4	16			
Wisconsin	3	5	2	7	153,420	149,950	303,370
Minnesota	1	1	0	1			
Missouri	1	1	1	2			
Colorado	3	3	3	6			
Oregon	0	0	1	1	199,789	197,942	397,731
Washington	0	0	1	1			
California	0	0	0	0			
Total	266	313	153	466	14,072,274	15,654,863	29,727,137

PRODUCTION OF BITUMINOUS COAL AND COKE PIG IRON.

New York	17	19	5	24	880,581	1,058,650	1,939,231
New Jersey	1	1	5	6	2,773	34,103	36,876
Pennsylvania	103	115	19	134	5,968,270	6,335,272	12,303,542
Maryland	2	3	1	4	106,377	112,226	218,603
Virginia	5	6	15	21	119,466	134,455	253,921
Georgia	0	0	2	2			
Texas	0	0	3	3			
Alabama	17	24	21	45	871,155	957,721	1,828,876
West Virginia	2	3	1	4	129,155	145,205	274,360
Kentucky	1	3	4	7	23,837	44,743	68,580
Tennessee	8	7	11	18	144,738	190,814	335,552
Ohio	48	58	15	73	3,285,511	3,515,201	6,800,712
Illinois	20	22	4	26	1,304,227	1,583,132	2,887,359
Indiana	10	10	0	10	808,258	957,683	1,765,941
Michigan	2	3	0	3			
Wisconsin	2	4	2	6			
Minnesota	1	1	0	1			
Missouri	0	0	1	1	195,903	226,071	421,974
Colorado	3	3	3	6			
Washington	0	0	1	1			
Total	242	282	113	395	*13,840,251	*15,295,276	*29,135,527

*Includes ferro-alloys made with coke and electricity, coke and natural gas, etc.

ANTHRACITE AND MIXED ANTHRACITE AND COKE PIG IRON.

New York	0	0	3	3	65,657	178,928	244,585
New Jersey	0	0	1	1			
Pennsylvania	3	10	12	22			
Total	3	10	16	26	65,657	178,928	244,585

PRODUCTION OF CHARCOAL PIG IRON BY STATES.

Massachusetts	1	2	0	2	8,793	8,573	17,366
Connecticut	3	3	0	3			
New York	0	0	2	2			
Pennsylvania	2	3	4	7	1,846	1,986	3,832
Maryland	0	0	1	1	1,311	1,878	3,189
Virginia	1	1	3	4			
Alabama	2	1	3	4	16,357	17,676	34,033
Georgia	0	0	1	1			
Texas	0	0	1	1	518	2,348	2,866
Kentucky	0	0	1	1			
Tennessee	1	0	1	1			
Ohio	1	0	2	2	241	1,684	1,925
Michigan	8	9	4	13	107,927	123,242	231,169
Wisconsin	1	1	0	1			
Missouri	1	1	0	1	29,373	23,272	52,645
Oregon	0	0	1	1			
California	0	0	0	0			
Total	21	21	24	45	*166,366	*180,659	*347,025

*Includes small quantities of pig iron and ferro-alloys made with charcoal and electricity.

TOTAL PRODUCTION OF PIG IRON ACCORDING TO FUEL USED.

Bituminous	242	282	113	395	13,840,251	15,295,276	29,135,527
Anth. & anth. & coke	3	10	16	26	65,657	178,928	244,585
Charcoal	21	21	24	45	166,366	180,659	347,025
Total	266	313	153	466	14,072,274	15,654,863	29,727,137

Miscellaneous Pig Iron Statistics.

PRODUCTION OF PIG IRON IN PENNSYLVANIA AND OHIO.

	Districts.	Blast Furnaces. In blast June 30, 1912.	Blast Furnaces. December 31, 1912. In.	Out.	Total.	Production—Gross tons. (Includes spiegeleisen, ferro-manganese, ferro-silicon, ferro-phosphorus, etc.) First half of 1912.	Second half of 1912.	Total for 1912.
Pennsylvania.	Lehigh Valley	10	15	10	25	444,533	507,535	952,068
	Schuylkill "	11	12	6	18	427,482	481,781	909,263
	L. Susq. "	8	11	4	15	230,518	332,256	562,774
	Juniata "	2	3	4	7	61,329	61,692	123,021
	Allegheny Co.	43	44	3	47	3,074,961	3,032,167	6,107,128
	Shenan. Valley	16	22	2	24	945,029	1,118,271	2,063,300
	Miscel. bitum.	16	18	2	20	850,075	980,498	1,830,573
	Charcoal	2	3	4	7	1,846	1,986	3,832
Ohio.	Mahoning Val.	19	20	4	24	1,424,685	1,464,878	2,889,563
	Hocking "	0	0	1	1	938,232	1,111,931	2,050,163
	Lake Counties	13	16	1	17			
	Miscel. bitum.	9	13	3	16	724,410	733,142	1,457,552
	H. R. bitum.	7	9	6	15	198,184	205,250	403,434
	H. R. charcoal	1	0	2	2	241	1,684	1,925

PRODUCTION OF BESSEMER AND LOW-PHOSPHORUS PIG IRON.

New York	276,596	345,295	621,891
Pennsylvania	2,152,153	2,250,038	4,402,191
Maryland	106,377	112,226	218,603
Virginia, West Va., Kentucky, and Tenn.	138,216	178,601	316,817
Ohio	2,015,369	2,162,598	4,177,967
Illinois, Wisconsin, Colorado, and California	883,644	1,046,543	1,930,187
Total	5,572,355	6,095,301	11,667,656

PRODUCTION OF BESSEMER AND LOW-PHOSPHORUS PIG IRON IN PENNSYLVANIA AND OHIO BY DISTRICTS.

Pennsylvania.	Lehigh Valley	101,542	129,503	231,045
	Schuylkill Valley			
	Lower Susquehanna Valley	41,802	50,682	92,484
	Allegheny County	1,253,258	1,264,171	2,517,429
	Shenango Valley	755,551	805,682	1,561,233
	Miscellaneous bituminous			
Ohio.	Mahoning Valley	939,257	996,846	1,936,103
	Lake Counties	571,205	668,829	1,240,034
	Hanging Rock bituminous	504,907	496,923	1,001,830
	Miscellaneous bituminous			

PRODUCTION OF BASIC PIG IRON, NOT INCLUDING CHARCOAL IRON.

New York and New Jersey	167,275	219,182	386,457
Pennsylvania—Allegheny County	1,719,000	1,636,489	3,355,489
" Other counties	1,358,734	1,775,565	3,134,299
Virginia	334,848	317,117	651,965
Alabama			
Ohio	762,752	791,615	1,554,367
Indiana and Illinois	928,000	1,107,910	2,035,910
Michigan and Colorado	134,767	141,223	275,990
Total	5,405,376	5,989,101	11,394,477

PRODUCTION OF SPIEGELEISEN AND FERRO-MANGANESE.

Pennsylvania	79,646	107,969	187,615
Illinois	13,515	20,595	34,110
Total	93,161	128,564	221,725

PRODUCTION OF ALL KINDS OF PIG IRON FROM 1908 TO 1912.

States—Gross tons.	Production—(Includes spiegeleisen, ferro-manganese, etc.) 1908.	1909.	1910.	1911.	1912.
Massachusetts	13,794	18,388	16,582	9,649	17,366
Connecticut					
New York	1,019,495	1,733,675	1,938,407	1,562,756	1,939,231
New Jersey	225,372	294,474	264,781	40,663	36,876
Pennsylvania	6,987,191	10,918,824	11,272,323	9,807,073	12,551,959
Maryland	183,502	286,856	326,214	255,816	219,546
Virginia	320,458	391,134	444,976	293,642	256,167
Georgia	24,345	26,072	14,725	1,200	.....
Texas					
Alabama	1,397,014	1,763,617	1,939,147	1,712,211	1,862,909
West Virginia	65,551	228,282	174,661	291,472	274,360
Kentucky	45,096	86,371	100,509	95,202	68,760
Tennessee	290,826	333,845	397,569	324,648	338,238
Ohio	2,861,325	5,551,545	5,752,112	5,310,506	6,802,637
Illinois	1,691,944	2,467,156	2,675,646	2,108,002	2,887,359
Indiana	348,096	964,289	1,250,103	1,163,932	1,770,628
Michigan					
Wisconsin	148,938	348,177	307,200	276,807	303,370
Minnesota					
Missouri					
Colorado	313,071	382,766	428,612	395,968	397,731
Washington					
California					
Total	15,936,018	25,795,471	27,303,567	23,649,547	29,727,137

BRITISH AND CONTINENTAL MARKETS

BRITISH IRON TRADE

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., Jan. 25.

Pig Iron.—Apart from the violent fluctuations caused by disturbances in eastern Europe, the pig iron market shows a decided improvement as compared with a week ago. By Thursday, the Cleveland market had completely recovered from the slump of last week and apparently was all the stronger because the withdrawal of speculators had gotten rid of a certain amount of inflation, but the sudden outbreak of revolution in Constantinople accounted for a fall yesterday. Today's quotation for Cleveland pig iron is 65s 3d ($15.96) for cash, one month 65s 9d ($16.16), three months 66s 4d ($16.24). Stocks remain practically unchanged at 238,000 tons in store. These fluctuations are wholly confined to the warrant market, makers regarding them with indifference. They are very well booked and there is no stock at any of the furnaces. Hardly any of the furnaces are producing full quantities, partly on account of weather conditions, the persistent wet weather affecting the coke and raw materials generally, while many of the furnaces are also needing attention from builders and engineers. The firmness of smelters speaks eloquently as to the sound condition of trade.

Finished Iron and Steel.—Galvanized sheets and tin plate continue weak and the latter, apparently, has gone off a little during the week; in fact, a meeting is to take place shortly to consider a proposal to reduce output with a view to putting some back-bone into prices. Both branches are suffering keenly from the ferment in eastern Europe, and the expected resumption of hostilities is already proving a bad blow to the tin plate trade. The eastern market has practically been lost through the war, and if it continues when the shipping season re-opens, the result will be still more serious. Galvanized sheets continue to be sold at £12 2s 6d, considered an unprofitable price. The mills continue fairly busy, but the capacity is now so large that there is always more or less keen competition for business. Wire makers continue busy and report that wire rods are more readily available than they were. There is still a very strong demand for puddled bars, so that comparatively high prices are obtained. Numerous sales have been made at £6 2s 6d.

GERMAN IRON TRADE

(*Special Correspondence.*)

Berlin, Jan. 16.—Germany's pig iron production in 1912 easily surpassed all previous records, being 17,852,600 tons against 15,557,000 tons, 14,793,300 tons, and 12,917,700 tons respectively during the three preceding years. Despite this large production there has been a continuous scarcity of the raw material during the past few months. The exports of pig iron in 1912 were 1,016,000 tons, compared with 832,000 tons in 1911. Imports of pig iron were 136,000 tons, against 131,000 tons, and those of iron ore 12,120,000 tons, against 10,820,000 tons in the preceding years. The exports of half-products totalled 634,000 tons (in 1911 651,000), of girders 497,000 tons (408,000), of rails 523,000 tons (520,000), of sleepers 139,000 tons (81,000).

The market has continued active in most departments. Calls for pig iron and half products continue on a large scale. Manufacturers of finished materials are busy filling old orders, of which, in most cases, they have a sufficient tonnage for some time ahead. Pig iron for early delivery is obtainable in small quantities only at a premium of 5 marks ($1.17½) over the schedule prices. Scrap prices are hardening. Deliveries of half-products are much in arrears, and the market is sold out to July. Prices are advancing, with billets for export 108 marks ($25.38) f. o. b. ocean port, sheet bars 112½ ($26.43¾) to 115 ($27.02½). Bars are firm, but quiet. Girders are quiet, but structural steel is scarce and commands premiums for early delivery. Plates are oversold for several months; sheets are quieter for export and prices irregular. Wire is in good demand for export. Rails and rolling stock are working under enormous pressure, chiefly for the government railways. Heavy rails for export are held at 120-125 marks ($28.30-$29.37½); light rails at 111-113½ marks ($26.08½-$26.67¼).

BELGIAN IRON TRADE

(*Special Correspondence.*)

Brussels, Jan. 16.—The Belgian market continues at the former high levels with the exception perhaps of iron, which, it is suggested, has advanced and has had to give way slightly. All steel goods, however, are firm and raw metal is very scarce. Cast goods are high in price, and half-products continue to stiffen and are now held at £5 4s ($25.31) to £5 5s ($25.56) for blooms, f. o. b. Antwerp. There can be no doubt that but for the political situation the position would be even stronger, and the same reason probably accounts for the slight weakening that has occurred in iron goods. Steel plates are quoted £6 14s ($32.62) for plates ¼ inch; £6 19s ($33.83) for ⅛ inch; £7 4s ($35.06) for 1/16 inch. Locally the prices quoted are 16.50 francs ($3.13) for steel bars; 16.75 francs ($3.18) for iron bars; 16.50 francs ($3.13) for girders; 17.75 francs ($3.37) for rods; 18 francs ($3.42) to 18.25 francs ($3.47) for steel plates and 18 francs ($3.42) to 18.50 francs ($3.51) for iron plates.

The export movement has been very satisfactory for a number of items, showing large increases in girders, rails, plates, bars, nails, tubes, wrought iron and steel, and making a total increase of 170,000 tons against a decrease of 5,000 tons on rods and wire, and leaving a net increase of 165,000 tons.

FRENCH IRON TRADE

(*Special Correspondence.*)

Paris, Jan. 16.—The figures for the production of iron ore in the Briey Zone lying along the German frontier show considerable progress in these French iron ore fields. In the year 1912 the production was about 12,500,000 tons against 10,427,000 tons in 1911. It is expected that by the year 1920 the annual production of Briey ore will be 20,000,000 tons a year. For a number of years the increase in production in this basin has been about 2,000,000 tons. The blast furnaces active in the district of Longwy on Dec. 31, numbered 36 out of a total of 41, leaving 5 not working. The corresponding figures for the Nancy district were 42 out of 48.

WAGE ADVANCES

Announced by Steel Corporation and Independents.

The new scale of advanced wages for day laborers, skilled mechanics and a large number of clerks employed by the United States Steel Corporation went into effect Feb. 1, following a brief announcement made early in the year by Chairman E. H. Gary. Nearly all of the independent mills have adjusted wages to conform with those of the Corporation.

Definite information concerning the advances was given Jan. 31, by A. C. Dinkey, president of the Carnegie Steel Co. The scale outlined by him in reference to the Carnegie company applies to all of the Corporation interests in the Pittsburgh and Youngstown districts.

The new scale is based on an increase to day laborers of 2½ cents an hour, or 25 cents a day. Previous to Feb. 1, day laborers in the Pittsburgh district received 17½ cents an hour, or $1.75 for a 10-hour day. The new scale gives day laborers 20 cents an hour or $2 a day. Wages of all day and turn men, including machinists, time and administration clerks were raised proportionately.

Day laborers in the Pittsburgh district had been receiving 17½ cents an hour since May 1, 1910, when, generally speaking, common laborers were advanced from 16½ to 17½ cents an hour. The increase offered Feb. 1, unsolicited, was one of the largest ever received by mill employes.

In the Pittsburgh district, practically 100,000 Corporation employes were benefited by the advanced scale. In Allegheny county, about 50,000 men were affected.

The Republic Iron & Steel Co., Youngstown, O., has already announced its intention of meeting the wage advance and similar action is expected by a number of other independent companies.

Will Exhibit Pictures

The "Mine to Molder" motion pictures of Rogers, Brown & Co., Buffalo, N. Y., will be presented before the foundrymen of Connecticut at New Haven on the evening of Feb. 8, in room 3, Sheffield Hall, Yale University. On the previous day, an exhibition will be given before the students of Yale University. On Tuesday evening, Feb. 4, the pictures were presented at Newark, N. J., under the auspices of the Newark Foundrymen's Association. The exhibition took place at the plant of Maher & Flockhart, 6 Polk street, and in the afternoon, a separate exhibition was given at the plant for the benefit of the employes. The pictures will also be presented in the auditorium of the Engineering Societies building, West Thirty-ninth street, New York City, on the evening of Feb. 18, at 8 o'clock. This is the first appearance of the pictures in that city.

PROPERTIES SOLD

Dispose of Holdings of Southern Iron & Steel Co.

Birmingham, Ala., Feb. 4.—The properties of the Southern Iron & Steel Co., Birmingham, Ala., were put up at auction in this city last week, in conformity with an order issued by the referee in bankruptcy, and were bid in by Edward H. Buss and Daniel Holman, of New York, the price bid being $1,530,000.

The name of the proposed reorganization that will take over the Southern properties is the Standard Steel Co. Announcement was made by J. W. Platten, chairman of the reorganization committee, that if new officers are to be chosen, their names will be announced later. The formal auctioning of the properties Friday was undertaken by James Bowson, trustee, they being divided into four parcels.

The properties of the Southern Iron & Steel Co. were appraised at practically $5,000,000.

The Standard Steel Co., Birmingham, Ala., has been formally incorporated to take over the properties of the Southern Iron & Steel Co., with a nominal capital of $2,000. The officers named are: President, James Bowron; vice president, H. Sanborn Smith; treasurer, Arthur Forsythe; secretary, Augustus Benners. The incororators include the foregoing officers and Walker Percy, Borden Burr, and Hugh Lester.

Judge E. H. Dryer has postponed confirmation of the sale of the properties for $1,530,000, details of which were published yesterday, at the request of the unsecured creditors. Mr. Bowron, who was receiver for the Southern Iron & Steel Co., stated Saturday that he believed the postponement was simply for the purpose of giving every one a fair chance to come to court and did not mean that the program heretofore outlined by the reorganization committee was to be seriously disturbed.

The foundry operated by the Yost Bros., of Creighton, Pa., was badly damaged by fire, Jan. 31.

EFFICIENCY ENGINEERS

Discuss "Organization," "Management" and "Industrial Hygiene."

The Efficiency Society, which was organized less than a year ago, held its second annual meeting at the Engineering Societies' building, New York City, on Jan. 27 and 28. The attendance was large, including a large number of the leading members of this new branch of engineering. The program provided for a symposium on "Organization," one on "Management," and others on "Efficiency in Government Organization," "Industrial Relations" and "Industrial Hygiene." Papers on various phases of efficiency were presented by John Colder, H. L. Gantt, William Lodge, J. G. Aldrich, Dr. Frederick A. Cleveland, Mrs. Harriet Fisher Andrew, Harrington Emerson, Dr. Katherine M. H. Blackford, Frederick L. Hoffman, Prof. Charles L. Parsons, Hon. Edgar T. Davies, Lee K. Krankel and Dr. Thomas Darlington.

Exhibits illustrating methods for the prevention of disease were made by the bureau of mines, the United States Steel Corporation, the American Iron and Steel Institute, the Norton Co., the Prudential and Metropolitan Life Insurance companies and the New York factory investigating committee.

Starts Works on Plant

Ground has been broken for the new open hearth steel plant of the Pacific Coast Steel Co., at West Seattle, which, when completed, will become a vital factor in the iron and steel industry of the city, says the Seattle (Wash.) *Times*. The plans prepared by President E. M. Wilson and Manager T. C. Slingan, with the approval of D. P. Doak of San Francisco and other large stockholders in the company, call for the construction of a plant costing $300,000.

The site on which the new plant will be erected includes, with ground already occupied by the iron mills of the company, approximately 45 acres. Two 35-ton open hearth steel furnaces and one mill with necessary shears, angle straighteners and other equipment will be erected this year.

The plant is not to be confounded with other projects under consideration by Seattle manufacturers for the construction of a steel foundry for the making of steel castings. The new plant at West Seattle will be able to furnish plates, tubes and sheet steel, and the policy of the company will be to enlarge its capacity as fast as the business of this section will warrant.

LATEST MACHINERY NEWS COLLECTED IN LEADING MANUFACTURING CENTERS

In New York, the trade reports that the best machinery business of the month was done during the closing week of January. Compared with December, however, the total sales of plant equipment the first month of the year is not as large. Buyers have displayed greater caution as a result of expected tariff changes. It is not generally believed, however, that future business will be seriously disturbed, once the contemplated revision has been effected. Prospects for a satisfactory aggregate of machinery orders in February are good. There is a large amount of inquiry before local dealers, covering all kinds of apparatus, and the indications are that considerable closing will be done in the next few weeks. The American Locomotive Co. has followed its inquiries put out last week with orders calling for prompt delivery of equipment for its Richmond, Va., plant. Orders were also placed for a fair aggregate of machine tools by the Sterling Metal Products Co., Lancaster, Pa. Building operations in the New York territory were active during January. Most suburban sections report large increases over the same period of 1912.

In Pittsburgh, a good volume of business continues to be enjoyed by machine tool dealers, builders, manufacturers and sellers of heavy machinery. Nearly all of the leading steel companies in this and the valley districts are in the market for additional equipment or replacements, and despite the fact that some of the most pessimistic claim the machinery market is extremely quiet, an unusually large number of tools are under negotiation, as announced in last week's issue of THE IRON TRADE REVIEW. *Shears, punches, grinders, drills and electric cranes are in demand.*

In Chicago, the tone of the machinery market is a little more encouraging, although prospects have been very good ever since the first of the year. This improvement is reflected principally in the purchase of fair lots by railroads, one western road recently taking 11 large lathes from the E. L. Essley Machinery Co. Machine tool dealers in Chicago are drawing on their stocks to a considerable extent, as many purchases calling for immediate deliveries have been made. There appears, however, to be a disposition among industrial concerns to delay buying, which may be ascribed in part to the feeling of uncertainty regarding the political situation. This disposition reflects conditions evident in many other iron and steel lines.

In Cleveland, the machine tool trade is enjoying a heavy buying movement which threatens to surpass the one prevailing during the latter part of last year. The number of orders closed during last week is large, while the volume of inquiries continues exceptionally heavy. Dealers are practically unanimous in declaring that prospects for business for several months ahead and probably for the entire year, are very promising and in one case a dealer states that prospective business is the heaviest in five years. All lines of tools are in demand. A large steam shovel interest in central Ohio has distributed a small list, which will be followed immediately by a larger one, the total representing about 75 tools.

In Cincinnati, most of the business done during the past week, and in fact during the past month, has been for export. A summation of the sales shows that radial drills have been the best sellers, with lathes and milling machines a close second. Domestic trade is promising. The large lists that certain railroads, including the Baltimore & Ohio, Erie, etc., have been expected to place before the trade for some time, have not shown any further indications of appearing shortly. Business is not evenly divided, as some of the plants report a scarcity of orders, and others more than they can fill, which is a condition that has existed here for some time. Electrical machinery is not selling as good as last month.

New Construction

The Western Pipe & Steel Co. is said to be considering the erection of a plant in Fresno, Cal.

The Melford Iron Foundry, Melford, Mass., has nearly completed several additions being made to its plant.

The Grand Island Culvert & Metal Works, Grand Island, Neb., is doubling its capacity and has just completed a new building.

The American Brass Co., Waterbury, Conn., is preparing to add a power house, 68 x 109 feet, of steel and brick construction.

The Interstate Stockyards Co., Toledo, O., is expending $400,000 in improvements, including a complete sewerage system and a waterworks plant. Thirty acres are being developed. Buildings to the amount of $1,000,000 will be erected.

The William Kennedy & Sons Co., Owen Sound, Ont., has purchased property worth $10,000 for an addition to its foundry.

Stephen Gyarpas has taken out a permit to erect a machine shop at 12 Frelinghuysen avenue, Newark, N. J.

R. H. Mathan, Newark, N. J., has plans for a boiler and engine house which will be erected at 128 Frankford street.

The Aluminum Products Co., Joliet, Ill., has awarded a contract for the construction of a factory building, 56 x 200 feet, one story.

The Modesto Mfg. Co., Modesto, Cal., contemplates the erection of a foundry and machine shop, at an approximate cost of $20,000.

The British Columbia Transport Co., Ltd., New Westminster, B. C., will build a cement plant at Port Alberni, Vancouver Island.

Allen & Garcia, McCormick building, Chicago, are preparing plans for a machine shop for the Crawford & McCrimmon Co., Brazil, Ind.

M. E. Goetzinger, Berkley, Va., has purchased a stave factory site, containing about 20 acres, and is planning to erect the necessary buildings.

The British-Canadian Canners, Ltd., Hamilton, Ont., have taken an option for the purchase of four acres of land

at Blenheim, Ont., on which they plan to erect a factory this spring. The factory will cost about $40,000.

The New Britain Gas Light Co., New Britain, Conn., has plans for a brick and steel addition, 35 x 100 feet, for its plant in that city.

The Scovill Mfg. Co., Waterbury, Conn., is preparing to build a casting shop, 125 x 160 feet, of concrete, brick and steel construction.

The Crane Valve Co., Bridgeport, Conn., is adding a three-story brick and steel building to its plant at a cost of $175,000. The building will be 97 x 332 feet.

Work of rebuilding the two new shops at the plant of the Atlas Crucible Steel Co., Dunkirk, N. Y., frame work of which was recently blown down, has begun.

The Rochelle Co., New York, will erect a factory in the manufacturing section of Long Island City, N. Y. The building will occupy the corner of Alilbur and Ely avenues.

The White River Construction Co. is constructing a large dam on the White River near Branson, Mo., as a part of a hydro-electric plant to be located at that point.

The New Britain Gas Light Co., New Britain, Conn., is planning to erect a new purifying plant, 37 x 114 feet, three stories, estimated to cost $12,000.

The Whitney Mfg. Co., Whitney, S. C., is planning to erect additional buildings, in which to install 10,000 spindles with accompanying machinery.

A ten-story addition, to cost about $1,250,000, is to be erected to the State Mutual building, in Exchange place, at Kilby street, Boston. Plans and specifications are in process of preparation.

The F. W. Marle Construction Co., Worcester, Mass., has the contract for the erection of a $650,000 hotel in Birmingham, Ala. The building will be of steel construction, 150 x 140 feet, 12 stories.

The International Sand, Lime, Brick & Machinery Co., Montreal, Que., has purchased land for a factory at Guelph, Ont. As early in the spring as possible the company will start work on a factory costing $90,000.

The Toronto & Northwestern Railway Co. will build a new line from Oshawa to Toronto, and thence up to the Georgian bay and down the shores of Lake Huron to London. The bill passed at Ottawa Jan. 28.

The Twain Electric Steel Co., Ltd., is preparing to erect a plant in Belleville, Ont., for the manufacture of steel directly from ore by an electric process perfected by J. W. Evans, of Belleville.

The Wheeling Steel & Tin Plate Co., Wheeling, W. Va., has begun the construction of a large plant near that city, and will be in the market for the equipment in the near future.

The Atlantic Sugar Refineries, Ltd., Montreal, Que., will erect a refinery costing $1,750,000, with a capacity of from 2,000 to 2,500 barrels a day, at St. John, N. B. Building construction work will begin at once.

Morgan, Walls & Morgan, architects, Story building, Los Angeles, Cal., advises that the construction of the machine shop for J. F. Holbrook, in that city, has been postponed.

The Majestic Mfg. Co., St. Louis, Mo., manufacturer of stoves and ranges, recently obtained a permit to build a five-story storage warehouse at 2015-17 Lucas avenue, St. Louis. Robert L. Staunton is president of this company.

The Park Cotton Mills Co., Lagrange, Ga., is planning to build a cotton mill addition, 109 x 196 feet, and will install textile machinery, together with the necessary accompanying machinery, at a total cost of $100,000.

The North Pacific Auto & Wagon Works, Portland, Ore., will erect a two-story machine shop at Ninth and Hoyt streets, that city, at a cost of $10,000. Charles Wackrow is manager. The plans are being prepared by the Oregon Architectural & Engineering Co.

Stewart Bros., Philadelphia, are receiving estimates on plans for a machine shop, 56 x 70 feet, one story, with a wing 25 x 46 feet, to be erected near Seventeenth street and Allegheny avenue, for the Harrison Safety Boiler Works, of that city.

The British Columbia Electric Railroad Co. will erect repair shops at Burnaby, B. C., in addition to its shops at New Westminster. The company has purchased a site of 60 acres, on which it will erect a plant employing from 450 to 600 men.

The Russell Mfg. Co., Alexander City, Ala., has approved plans for two additional buildings to its plant; 110 x 145 foot mill extension, and 100 x 60 foot warehouse enlargement, both of brick and steel construction.

The American Brass Co., 99 John street, New York, is considering plans for making improvements at its plant in Waterbury, Conn. The additions to be made include a power house, 68 x 109 feet, and a coal bin, 79 x 132 feet.

The Preston Car Coach Co., Preston, Ont., will build four more erecting shops the size of the present ones, 60 x 200 feet, thus doubling the plant's capacity, and creating work for 300 or 400 more men. A two-story mill building will also be erected.

The Huron Lake Shore Railway Co. will build an electric line from Sarnia, Ont., to Meaford, Ont., when government sanction has been obtained. The scheme also includes a steamboat service, and telegraph, telephone and express operation.

The works of the Canada Refining & Smelting Co., Orrilia, Ont., which was partially destroyed by fire last week, will be rebuilt without delay, according to W. H. T. Smith, president of the company, following a recent meeting of the directors in Providence, R. I.

The Canton Steel Castings Co., Canton, O., is building an addition to its plant, which will allow its capacity to be increased over 100 per cent. This company also is installing several new ovens, and plans to replace all its old ovens with new ones within a short time.

H. E. Talbot Co., of the Soo, has been awarded a contract for the construction of a 1,500-foot dam and the installation of a complete hydro-electric system at Grand Mere, Ont., developing 75,000 horsepower. The contract involves over $1,500,000, and will employ 1,000 men.

The Nortmann-Duffke Foundry Co., Milwaukee, Wis., recently purchased a building site, and advises that it expects to have the building of a new shop, 60 x 120 feet, two stories, start as soon as the weather permits. The new building will be used as a perforating shop, for perforating all kinds of metals.

F. L. Hague, Minneapolis, Minn., will draft the plans for the new $100,000 mill that will be erected by the Union Mill Co., Cedar Falls, Iowa. The new mill will be built on the site of the old Obermann mill, that was destroyed by fire several years ago. The plans for the new mill will call for a modern, up-to-date structure of concrete and steel.

The Fulton Co., Knoxville, Tenn., founder and machinist, has purchased a building site containing seven acres, and is planning to erect an additional plant. During the past year, this company built an addition to its present plant, which has been in operation for several years, and now employs 265 men.

The Hasco Building Co., 17 Madison avenue, New York, has taken the general contract for constructing a 12-story commercial building to be erected at 16 to 24 West Sixty-first street. When completed the building will be leased by the Locomobile Co. of America. The building is estimated to cost $400,000.

The Eureka Foundry Co., Eureka,

Cal., founder and machinist, is planning the immediate expenditure of $10,000 for an additional foundry, in order that the company may enter the northern and Oriental trade. At a recent meeting of the stockholders, G. W. Watson was elected president, and R. T. Earle superintendent.

J. C. Llewellyn, First National Bank building, Chicago, has plans prepared for a foundry for Nicholas & Shepard, Battle Creek, Mich. The building will be about 200 x 220 feet, and the cost will be in the neighborhood of $60,000. Construction, however, is being postponed for the present, and no bids have been invited.

The Bethlehem Steel Co. has awarded J. M. & C. J. Buckley, Worcester, Mass., the contract for the erection of a fireproof warehouse at Sixth and Binney streets, Cambridge, Mass., for the storage of tool steel, the buildings to be of brick and concrete construction, 122 x 62 feet, one-story, with temporary roof, to permit of the addition of another story when necessary.

The Alton Steel Co., Alton, Ill., manufacturer of steel hoops, bands and cotton ties, advises that its new plant at Alton is now well under construction. The company will install two 40-ton open-hearth steel furnaces, a billet mill, 10-inch hoop and band mill with a 12-inch Morgan roughing set and an 8-inch hoop mill. (Noted Jan. 16 and 30.)

The Manitoba government will build a system of railways in the northern part of the province. Le Pas will be the terminal of two roads from Winnipeg. Two lines are planned for near Manitoba, to circle Lake Winnipeg. Another will run from Winnipeg to Port Wilson, and another will extend west from Lake Winnipeg to Fort Churchill.

The Napanee Iron Works, Ltd., Napanee, Ont., successor to the Dominion Rock Drill Co., advises that, although it has been occupying new shops since August, its plant is not large enough. At the present time, the company is making preparations to build a new boiler shop, which will be equipped with the latest types of machinery.

The Orenstein-Arthur Koppel Co., Koppel, Pa., manufacturer of industrial and portable railways, is building a new office building at its plant, 100 x 160 feet, two stories, of brick and steel construction, and fitted with all modern conveniences. As soon as this building is completed, the general offices of the company will be moved from Pittsburgh there.

The Wilhoit Refining Co., Springfield, Mo., has purchased six acres of land near Joplin, Mo., on which it plans to build a $40,000 oil refinery. All crude oil for the refinery will be shipped or piped from the Oklahoma and Louisiana fields. The offices of this company will be in Springfield, where incorporation papers were filed recently by E. M. Wilhoit and W. A. Smith.

The Boynton Engineering Co., Waterloo, Ia., recently organized, is planning to erect a plant for the manufacture of scales and gasoline engines. The company, which is headed by J. F. Boynton, is capitalized at $100,000. Four sizes of gasoline engines will be made, ranging in horsepower from 1½ to 15. The Boynton scale was formerly manufactured at Toledo, O.

The James Radcliffe & Sons Co., Paterson, N. J., is building a new erecting shop, 28 x 139 feet, one story, of brick and steel construction. Due to the shop being in the heart of the city, the side walls will contain no windows, the daylight being let in through skylights, and the effect being enhanced by having the interior of the building painted white. The lights for night work have not yet been agreed upon, and the equipment for the shop has not been arranged for.

The Chicago Bearing Metals Co., McCormick building, Chicago, has let contracts for the erection of a brass foundry, 197 x 273 feet. The building will be one story with the exception of that part containing the offices, which will be two stories in height. It will be fireproof throughout, of brick and steel construction, having tile roof and brick floor. The 510 tons of steel required for the structure will be fabricated by Hansell & Elcock Co. F. W. Perkins, 21 East Van Buren street, Chicago, is the architect.

The Minneapolis Steel & Machinery Co., Minneapolis, Minn., is building a new plant at Calgary, Alta., which includes a machine shop 100 x 600 feet, and a foundry 100 x 80 feet, of brick and steel construction. The new plant will be equipped with the most modern machinery throughout, and the company is now in the market for this equipment, orders for which will be placed very shortly by D. M. Robinson, purchasing agent of the Pioneer Tractor Mfg. Co., Winona, Minn., with which company the Minneapolis Steel & Machinery Co. has a joint purchasing agreement.

P. R. Duchemin, Colfax, Wash., is said to be considering the erection of a plant in that place for the manufacture of a patented speed accelerator for wood and steel drills, which he invented. It is proposed to build a factory with a capacity of 500 accelerators a day. The invention is a cogged wheel which can be attached to an ordinary brace and will increase the speed of a steel drill four times, while the increase for wood drills or bits of two and one-half times. It is an automatic force feed with separate attachments, each of which weighs 2½ pounds.

The Northwestern Fuel Co., St. Paul, Minn., a Wisconsin corporation which recently increased its capitalization from $3,000,000 to $5,000,000, will expend more than $150,000 at once in improving and rebuilding its dock No. 1 at Superior, Wis. The contract involving this amount has been awarded to the Heyl-Patterson Co., Pittsburgh, which will begin work about March 1 on extending the dock, rebuilding the old and erecting new rigs, and enlarging the storage bins. The Northwestern has large water front holdings at Superior not now occupied, which will come in for improvement under the additional stock issue apportionment. B. A. Galleher is superintendent at Superior.

Machine Tools

Thomas Rates, Sodus, N. Y., is inquiring for a 10 to 14-inch buzz planer.

The Carnahan Tin Plate Co., Canton, O., is inquiring for a 100-inch shear.

The Reeves Mfg. Co., Canal Dover, O., is in the market for a 126-inch shear.

The Phillips Mine & Mill Co., Pittsburgh, has closed negotiations for a 24-inch punch.

The Moyer Mfg. Co., Montivideo, Minn., advises that it recently installed a steam heating plant and a number of machine tools.

The Pittsburgh Crucible Steel Co., Midland, Pa., has entered the market for 18 punches and shears of miscellaneous type, for installation in its new works.

The American Rotary Valve Co., Anderson, Ind., is having a large oven installed, and has ordered a crane for its new foundry, 40 x 90 feet, just completed.

Samuel Trethewey & Co., Ltd., Pittsburgh, manufacturers of steam hammers, are contemplating the installation of some new machinery, including high speed planers and shapers and gap lathes.

The Cambria Steel Co., Johnstown, Pa., has entered the market for five punches and shears of various types.

The Hoover Spring Co., San Francisco, advises that it has moved into its new factory at 617-637 Turk street, and states that the only present machinery

requirements are for a punch and a shear.

The Louisville Axe & Tool Co., Louisville, Ky., is reported to be considering the purchase of a considerable amount of new machinery. J. D. Augustus, secretary of the company, may be addressed for details.

A large perforating press that will punch a 2¼-inch hole through metal 1¼-inch thick, and which is capable of handling a sheet ten feet wide, any length, has been contracted for by the Nortmann-Duffke Foundry Co., Milwaukee, Wis.

The Dempster Mill Mfg. Co., Beatrice, Neb., manufacturer of farm and ranch water supplies, advises that during the past year it has installed a number of new pieces of machinery, in the way of large boring machines, lathes, and a number of modern foundry appliances.

Water Works

George W. Atkinson, Louisa, Ky., is arranging to construct a water works at Paintsville, Ky., having been given a franchise for the purpose by the municipality.

The Dix River Power Co., recently incorporated in Kentucky, is reported to have succeeded in having a $4,000,000 bond issue underwritten in New York, and will proceed with the construction of a water power plant on the Dix river near Danville, Ky. L. B. Herrington, Richmond, Ky., is president of the company.

Bridge News

A steel bridge over the Pitt river, B. C., is to be built to provide for wagon traffic, and electric and steam railroads. It will be erected by the province of British Columbia.

Tenders will be called for shortly for a 320-foot single span bridge over the River Thames at the Wharncliffe road, London, Ont. City Engineer Brazier with a committee has the matter in hand.

Three bridges are required in York township, Ont., at the following points: Over the Soo river at York Mills, on the fifth concession opposite Russell road, and at Eglington avenue. Township Engineer Barber will report on the cost.

The construction of a $5,000,000 railroad bridge over the Mississippi river at Memphis, Tenn., is to be undertaken following the agreement which has been reached between the city authorities and the terminal company, which is a subsidiary of the Rock Island Railway Co. The style of the former is the Arkansas & Memphis Railroad Bridge & Terminal Co. It has secured authority from the government to build over the river.

The contract for the superstructure of the West Algoma street bridge at Oshkosh, Wis., has been awarded to the Joliet Bridge & Iron Co., Joliet, Ill., for $86,440.00, and the contract for the substructure was awarded to the Fitz Simons & Connell D. & D. Co., Chicago, for $93,522.82. The Scherzer Rolling Lift Bridge Co., Chicago, is engineer.

Power Plant Equipment

Mayor Schnabel, Corydon, Ky., is in charge of the purchase of equipment for the electric light plant.

The St. Bernard Mining Co., Earlington, Ky., will purchase a steam turbine in the near future. Frank D. Rash is general manager.

Dresden, Tenn., is preparing to issue bonds for the purpose of constructing an electric light system and a water plant.

The Burra Mining Co., which is developing copper mines at Ducktown, Tenn., will add to its power plant, installing boilers, generators, etc.

The Kimble Electric Co., Chicago, is planning to erect a two-story mill building at the corner of Western avenue and Erie street, Chicago. Roy D. Keehn is interested.

The Northwestern Electric Co., Portland, Ore., is rapidly completing its plant, which will supply light and power for that city. W. E. Coman is vice president and general manager.

The Seelbach Hotel Co., Louisville, Ky., has obtained a franchise from the city enabling it to construct its new $75,000 power plant. Webster Gazolay, Louisville, is engineer in charge of the construction of the plant.

J. W. Johnson & Co., Jackson, Ky., who have purchased 30,000 acres of hardwood timber in Letcher county, Ky., are planning to erect a large sawmill on the property, and will require power and special machinery.

Sealed tenders addressed to the chairman of the board of control, Winnipeg, Man., will be received until Friday, Feb. 14, for the delivery to the power house at Point du Bois, Man., of a 9,000-kilowatt, three-phase, step-up transformer, with oil and accessories.

It is reported that Stone & Webster, Boston public utility operators, will build a steam power plant costing $1,000,000 at or near Pinesville, Ky. It will serve the coal mines of the eastern Kentucky and western Virginia field, and on account of the accessibility of coal it is possible that power can be produced cheaply.

A contract for supplying the electrical equipment necessary for the electrification of the suburban railroads of Melbourne, Australia, has been awarded to the General Electric Co. The equipment will cost approximately $4,000,000. The total cost of the electrification of the line is placed at $12,000,000.

The Langstadt & Meyer Construction Co., Appleton, Wis., has been awarded two large electrical equipment and installation contracts. The Watertown (Wis.) Canning Co. is changing its entire drive to electricity, with individual motors, and will produce its own power. The Marathon Brewing Co., Wausan, Wis., is also changing from steam to electricity and will use individual motor drive.

The town of Dalhousie, N. B., is in need of the following equipment, contracts for which are divided as follows: (B) power house; (G) booster pump; (I) steam pump, (2) turbine pump; (H) two boilers; (J) electric light engine, (1) high speed steam engine, (2) gas engine and gas producers, (3) Diesel oil engine, (4) crude oil engine; (K) electrical equipment and distribution system. Sealed tenders will be received by the town clerk of Dalhousie until 8 p. m. on Wednesday, March 5. Plans and specifications will be ready after Feb. 10.

New Buyers

The Alaton Saw & Steel Co., Philadelphia, has been incorporated with a capital of $100,000.

The Devaux Seamless Radiator Co., in process of organization, advises that it is buying equipment for its plant.

The Yarborough Pick Motion Co., Atlanta, Ga., was recently chartered with a capital stock of $20,000, to manufacture textile machinery.

The Chicago Scrap Material Co., Chicago, has been incorporated with a capital of $2,500, by Samuel Cohen, Joseph E. Cohen and Louis B. Miller.

The Charles Bridoux Machine Co., Chicago, has been incorporated with a capital of $10,000 by Benjamin Samuels, Mort Nathan and C. Aaron.

The Klimax Electric Co., Chicago, has been incorporated with a capital of $25,000 by M. J. Isaacs, James D. Woley and John D. Silber. The company will manufacture electric appliances.

The Sterling Valve Co., Springfield, Mass., has been incorporated with a capital stock of $75,000; by J. L. Beck, president; A. N. Pierson, treasurer, and A. W. Farley.

The O. M. Edwards Co., Syracuse, N. Y., has been incorporated with a capital stock of $1,250,000, by O. M.

Edwards and others, of Syracuse, to manufacture railway supplies.

The Elliptical Wheel Co., Chicago, has been incorporated with a capital of $100,000 to manufacture vehicles, etc., by A. F. Priest, James Powers and A. L. Kanagy.

Application for a charter for the Refined Iron Co. has been made at Harrisburg, Pa. J. C. De Noon, I. N. De Noon, A. S. Karr, Charles Snyder and W. G. Forcett, all of Pittsburgh, are named as incorporators.

The National Labeling Machine Co., New York City, has been incorporated with a capital of $30,000. F. Becker and E. N. L. Young, Long Island City, New York, are among the directors.

The Peru Castings & Machinery Co., Peru, Ind., has been incorporated with a capital of $25,000, to manufacture and sell machinery; by C. E. McCampbell, R. M. Carter and I. H. Barbee. (Noted Jan. 16.)

The Wyoming Mfg. Co., Cheyenne, Wyo., has been organized by R. J. Johnson and H. I. Twigg, to manufacture sheet metal products. Flumes, culverts, pressure pipes, headgates, etc., will also be made.

The Goodnow Mfg. Co., Boston, Mass., has been incorporated with a capital of $25,000, to manufacture automobile supplies; by Russell J. Goodnow, Walter A. Ladd and Archibald MacGregor.

Application for a charter for the Refined Iron Co. has been made at Harrisburg, Pa. J. C. De Noon, I. N. De Noon, A. S. Karr, Charles Snyder and W. G. Forcett, all of Pittsburgh, are named as incorporators.

The Toledo Drill & Tool Co., Toledo, O., has been incorporated with a capital stock of $45,000 to do a general manufacturing business. Among the incorporators are Conlin L. Campbell, Robert L. Ellery and Charles Hartman.

The Louistown Electric Co., Louistown, Ill., has been incorporated by H. C. Hall, William L. Hall and C. V. Smith for the purpose of manufacturing and distributing electricity and also manufacturing and dealing in electrical appliances.

The Portable Cotton Compress Co., Wilmington, Del., has been incorporated with a capital of $200,000 to manufacture, sell and deal in portable cotton compress machines; by Herbert E. Latter, Norman P. Coffin and W. J. Maloney.

The Sterling Hardware Co., Bluefield, W. Va., has been incorporated with a capital of $100,000 to manufacture and deal in hardware. The incorporators are: R. C. Morrison, E. H. Smith, J. H. Custard, J. H. Hardy and F. M. Archer, all of Bluefield.

The J. D. Maxwell Corporation, Tarrytown, N. Y., has been incorporated with a capital of $10,000 to manufacture automobiles, motors, etc.; by Jonathan D. Maxwell, Tarrytown; and James P. McManus and Leander K. Shiffin, New York City.

The Norwalk Electric Mfg. Co., South Norwalk, Conn., has filed a certificate of organization, with a capitalization of $100,000. The officers are: President, Joseph A. Volk Jr.; vice president, W. B. Hurlbut; secretary and treasurer, Stewart H. Elliott.

The Traction Plow Guide, Long Prairie, Minn., has incorporated with a capitalization of $10,000, to manufacture plow guides, machines, tools, and mechanical devices. The incorporators are: H. S. Johnson, Arthur T. Lathrop, and Walter D. MacLeith, all of St. Paul.

The Redan Speciality Co., Inc., New York City, has filed articles of incorporation, to engage in the manufacture of mechanical goods. The capital stock is $20,000. Greaff Miller, 25 West Broadway and W. B. Beebe, 262 West Eighty-ninth street, New York City, are the incorporators.

C. B. Kimberly Co., Wheeling, W. Va., has been incorporated with a capital of $10,000 to construct buildings and bridges, and to manufacture material for construction work; by C. B. Kimberly, Jr., E. D. Kimberly, A. A. Douglass, E. C. Bailey and J. E. Oss, all of Wheeling.

The Regle Brass Co., Marysville, O., advises that it is completing its building, 50 x 165 feet, and that the nature of its output will be plumbers' brass goods. The company is incorporated under the laws of Ohio for $75,000. The equipment for the new plant is practically all contracted for at the present time.

The Package Machinery Co., Boston, Mass., has been incorporated under the laws of Massachusetts, with a capitalization of $1,000,000. The new company will manufacture wrapping, weighing and folding machines. The incorporators are: Edward T. Roche, Boston; John R. Lazenby, Lynn, and M. A. Daniher, Natick.

The business of Leitelt Bros., brass founders, located at 6338 Madison street, Chicago, has been incorporated with a capital of $10,000, the incorporators being Edward Leitelt, Matthew J. Hevenor and Charles F. Leitelt. Some improvements in both buildings and equipment are planned, but nothing definite has been decided as yet.

The Francois Coal & Coke Co., Clarksburg, W. Va., has been incorporated with a capital of $100,000, to develop coal lands, manufacture coke and drill for oil and gas in Harrison county, West Virginia; by V. E. Cooke, J. M. Francois, J. C. Williams, E. J. Francois and E. L. Spraker, all of Clarksburg.

Articles of incorporation have been filed in Louisville, Ky., by the American Brass & Plating Works, incorporated with $8,000 capital stock. The concern has purchased the brass working plant of the Houser Mfg. Co., at 633 East Jefferson street in that city. It is probable that enlargement will be made later. Thomas J. Hines, John J. Brennan and J. A. McGill are incorporators.

The S. M. Mfg. Co., Chicago, has been incorporated with a capital of $5,000 by L. J. Schureman and George M. McFedries. The company will manufacture electric accessories for automobiles. A building has been leased at 2437 South Michigan avenue, and all immediate machinery requirement have been purchased from the E. L. Essley Machinery Co.

The Owen Sound Rolling Mills Co., Ltd., Owen Sound, Ont., has been incorporated at Ottawa with a capital stock of $500,000, to manufacture wrought iron and steel, pipe and tubing, bar iron and steel, railway steel, etc. The incorporators are H. Macdonald, J. Drew, F. Watt, P. J. Ryde and A. Cabeldu, all of Guelph, Ont.

The Loyal Motor Car Co., Ltd., Strathroy, Ont., has been incorporated at Ottawa with $500,000 capital, to manufacture and deal in automobiles and accessories, machinery and vehicles of other kinds. The incorporators are D. W. Henry, J. M. McEvoy, H. E. Anderson and C. S. Parker, all of London, Ont., and C. C. Wright, of Strathroy.

The Canadian Griscom-Russell Co., Ltd., Montreal, Que., has received Dominion incorporation, with $50,000 stock, to carry on the business of iron founder, manufacturer of machinery of all kinds, tool maker, engine and boiler maker, etc. The incorporators are J. W. Cook, A. A. Magee, T. J. Coonan, T. B. Gould and P. C. Mahoney, all of Montreal.

The Hay Walker Brick Co., a $1,000,000 corporation, has been organized to take over a building brick department of the Harbison-Walker Refractories Co., Pittsburgh. Officials are: Hay Walker, president; Edward E. McCoy, former assistant cashier to the Keystone National Bank of Pittsburgh, secretary and treasurer; and C. J. Henderson, eastern sales manager.

New Incorporations

(In order to assist the post office in delivering letters to new concerns, it is suggested that the names of incorporators be written in the lower left hand part of every envelope addressed to such new companies.)

The following manufacturing companies have filed articles of incorporation:

General Motor Truck Co., Toledo; $50,000; by C. B. Grandy, C. O. Norton, E. M. Dotson and W. C. Prickett.

Parrett Tractor Co., Ottawa, Ont.; $25,000; by Dent Parrett, Henry T. Parrett and Henry Pollard.

Uneeda Gas Iron Co., Vineland, N. J.; $50,000; manufacture gas irons; by Harry Abramson, Frank Mennie, Anna Amrakson.

Humble Ironworks, Humble, Harris county, Tex.; manufacture of oil well supplies; $10,000; by H. S. Cameron, T. W. Horn, P. O. Davant.

Frank B. Lothrop Co., Acton, Mass., metal workers; $20,000; by Frank B. Lothrop, Charles H. Capelle, Charles P. Tucker.

Precision Tool & Mfg. Co., Dayton, O.; $25,000; C. Deleon, Oliver Bangham, M. E. Wortman, Robert P. Wortman, J. A. Wortman.

Cleveland Vending Machine Co., Cleveland; $10,000; by William Ambler, W. Scott Rader, N. N. Starr, F. S. Owen, Olney D. Owen.

Syracuse Sash Weight Foundry, Inc, Syracuse, N. Y.; to deal in general foundry and machine business; $5,000; by Samuel Wiesman, Levi Plant, Etta Plant and Rose Wiesman.

International Harvester Corp., Hoboken, N. J.; $70,000,000; manufacture agricultural implements; by Harold F. McCormick, Wm. J. Ouderback, Wm. L. Saunders.

Middleby Criterion Oven Co., Kittery, Me., to manufacture and deal in ovens and stoves; $10,000; by President, Herman R. Paul, of Kittery; treasurer, William E. Burke, of Boston.

Mathias Range & Oven Co., Inc., Manhattan, N. Y.; manufacture stoves, ovens, etc.; $250,000; by Henry J. Mathias, 220 West Thirty-fifth street, New York City, Samuel Falk, R. L. Cherburg, both of 299 Broadway, New York City.

Economy Devices Corp., New York City, to manufacture railroad appliances and engage in a general foundry business for castings of iron, brass, steel, etc.; $150,000; by R. F. Ball, Samuel G. Allen and Joel S. Coffin, all of 30 Church street, New York City.

American Steel Frame & Band Iron Co., Inc., New York City; to manufacture steel frames for dress suit cases, etc.; $25,000; by Harris Danzig, 1350 Stebbins avenue, Benjamin Markowitz, 911 Fox street, and Max Markowitz, 1036 Bryant avenue, all of New York City.

Structural Contracts

A contract for several hundred tons of steel will be let soon by Architect Lou Ditto, of Cincinnati, for use in the seven-story addition to the Munro Hotel, that city. The new addition will be 75 x 87 feet.

The Otis Elevator Co., Buffalo, which is planning to build a foundry addition, 107 x 400 feet, will require about 700 tons of structural steel. Green & Wicks of Buffalo are the arhcitects. Bids will soon be taken.

The United Iron Works, Springfield, Mo., advises that it recently closed a contract with the White River Construction Co. for the structural steel necessary for the power house of a hydro-electric plant being built on the White river, near Branson, Mo.

The Wright Wrench & Forging Co., Canton, O., has awarded the contract for the steel work on an addition, 50 x 100 feet, and recently purchased a 500-ton hydraulic press, a 26-inch lathe, a large crane, a 125-horsepower engine, and a 75-kilowatt generator.

The Pioneer Tractor Co., Ltd., Winona, Minn., manufacturer of gas tractor engines, has closed a contract with the Minneapolis Steel & Machinery Co., Minneapolis, Minn., for the steel for its new plant at Calgary, Alta. The Minneapolis firm expects to start manufacturing a complete line of tractors in its new plant about July 1.

Increased Capital

The Buckeye Churn Co., Sidney, O., has increased its capital stock from $150,000 to $250,000.

The Galion Metallic Vault Co., Galion, O., has increased its capital from $100,000 to $200,000.

The Ideal Stencil Machine Co., Chicago, has increased its capital from $50,000 to $80,000.

The Acme Wire Co., New Haven, Conn., has filed a certificate of the issuance of 1,000 shares of capital stock, making the outstanding stock $300,000

The International Harvester Co., Hamilton, Ont., has called a special meeting to authorize capital stock reduction from $140,000 to $70,000.

The Columbus Iron & Steel Co., Columbus, O., has increased its capital stock from $1,000,000 to $1,500,000.

The Milwaukee Steel Foundry Co., Milwaukee, Wis., has filed an amendment to its articles of incorporation, increasing its capital stock from $10,000 to $150,000. The plant at 157-175 Virginia street, Milwaukee, is to be enlarged, but plans are not ready for publication at this time.

The Union Twist Drill Co., Athol, Mass., has absorbed the plants of the S. W. Card Mfg. Co., Mansfield, Mass., and Butterfield & Co., Derby Line, Vt., both of which concerns manufacture taps and dies. The Union Twist Drill Co. will increase its present capitalization of $1,000,000, and operate the plants of the two companies just purchased as auxiliaries to its main plant.

The Grasselli Chemical Co., Cleveland, is increasing its capital stock from $7,500,000 to $20,000,000, of which $5,000,000 will be 6 per cent cumulative preferred. No immediate disposition of the new stock is contemplated by the directors; it will be issued whenever the increase of business makes additional funds desirable. At the annual meeting, held Tuesday, all directors and officers were re-elected.

Recent Sales

The Milwaukee Reliance Boiler Works, Milwaukee, Wis., recently signed a contract with the Mineral Point Public Service Co., Mineral Point, Wis., for a 1,000 horsepower boiler feed water heater and purifier.

The New England Investment & Security Co. has placed an order with the General Electric Co., Schenectady, N. Y., for an economizer to be installed in the Millbury, Mass., power station of the Worcester, Mass., Consolidated Street Railway Co. The apparatus will cost about $20,000. A 500-kilowatt turbine has also been ordered for the same plant from the General Electric Co.

The Chattanooga Machinery Co., Chattanooga, Tenn., manufacturer of band saw mill equipment, recently contracted to supply the Carr Lumber Co., Pisgah Forest, N. C., with a single eight-foot band saw equipment, consisting of a power plant, including 450 horsepower high pressure boilers, a pair of 10 x 20 inch engines, a heavy eight foot band mill, weighing 37,000 pounds, a 54 inch steel carriage with steam set works, and a heavy edger. This company is also manufacturing at the present time a similar equipment for the Carolina Spruce Co., Pensacola, N. C., and advises that it has more orders booked at the present time than at any previous time in the history of the company, and that these orders are coming from a wide area of country.

Trade Notes

The Canton Steel Castings Co., Canton, O., recently purchased four cranes.

T. M. Cox has purchased the interest of C. T. Childers in the Galesburg Cornice Works, Galesburg, Ill.

The Patterson Foundry & Machine Co., East Liverpool, O., has just completed a new office and assembling building.

The New Era Gas Engine Co., will be merged with the Portsmouth Engine Co., Portsmouth, O., according to reports from that city.

Workmen employed by the Miami Cycle Co., Middletown, O., have gone on strike to the number of several hundred, demanding a wage increase.

The Wheeling Steel & Iron Co., Wheeling, W. Va., has installed three additional pipe cutting machines in its plant at that city.

The new gray iron foundry for the No. 3 plant of the Emerson-Brantingham Co., Rockford, Ill., has just been placed in operation.

George Gilderman, Laporte, Ind., contemplates the erection of a gray iron foundry. The company will be capitalized at $30,000.

The business of the W. R. Beatty Machinery & Equipment Co., 909 People's Bank building, Pittsburgh, has been closed.

Guthrie B. Plante has been appointed receiver for the American Infusion Steel Process Co., 60 Broadway, New York City.

All of the furnaces of the Pennsylvania Steel Co.'s Steelton plant made bonuses during January. Lochiel furnace has been put into operation.

P. B. Yates, president of the Berlin Machine Works, Beloit, Wis., is said to have acquired more than one-third of the capital stock of the S. A. Woods Machine Co., Boston.

The Simplex Electrical Co., Boston, has changed its name to Simplex Wire & Cable Co., and advises that no change of management or interests is affected by the change of name.

O. L. Hesla, president of the Automatic Valve Seating Machinery Co., Sioux City, Ia., has sold his interest in the concern to the Solvsberg brothers, members of the company.

Dietrich Bros., Baltimore, who are planning extensive additions, as previously noted in THE IRON TRADE REVIEW, are in the market for several special shears.

Smith & Wesson, Springfield, Mass., have designed an automatic pistol, which they propose to manufacture and may move to a new and larger plant in that city.

J. Frank Douglas has been appointed trustee of the Taylor Machine Co., Penn Yan, Pa., bankrupt, in the place of William C. Snow, who did not qualify.

Frank LeRoy Pratt, Boston, dealer in and repairer of marine engines, has filed a voluntary petition in bankruptcy. Liabilities are placed at $4,899 and assets at $76.17.

The Taylor-Wharton Iron & Steel Co., High Springs, N. J., announces that its western sales office has been moved from 203 Mills building, San Francisco, to 504 Newhouse building, Salt Lake City, Utah.

The Henry Vogt Machine Co., Louisville, Ky., manufacturer of ice and refrigerating machines, advises that it has been unusually successful during the past few weeks in securing important contracts.

The Pankow Bros. Foundry & Machine Works, Sioux Falls, S. D., was established in 1884 by five brothers, who, 29 years from that date, continue in active charge of the business, which has been a decided success.

The International Motor Co., 1770 Broadway, New York, has recently taken over the following motor truck factories: Hewitt Motor Co., 102 West End avenue, New York; Mack Bros. Motor Car Co., Allentown, Pa., and the Saurer Motor Co., Plainfield, N. J.

Following the retirement of E. J. Snyder, of the Snyder, Thorne & Shaw Co., Toledo, O., contracting engineers, the firm's name has been changed to the Shaw-Thorne Co., and the offices have been moved to the Nasby building.

Crane Co., Chicago, has purchased a controling interest in the Hitchcock Supply Co., Springfield, Mass., and for the present will maintain its store there as a station with which to supply the trade throughout the central and western parts of the state.

The Duff Mfg. Co., Pittsburgh, has moved into its new plant, 600 x 125 feet, located on Preble avenue, Pittsburgh. About four months ago, the Duff company absorbed the Dunn Mfg. Co., Pittsburgh, and now has a capital of $30,000. J. R. McGinley is president.

The forging business established by J. A. Sundberg, which has been conducted under the name of the J. A. Sundberg Co., Chicago, has been purchased, and will hereafter be known as the Sundberg Co., the ownership and management of the business remaining unchanged.

The Luther Brinder Mfg. Co., 161-171 Michigan street, Milwaukee, elected the following officers at the annual meeting: President, C. J. Luther; vice president, F. S. Newton; secretary, L. L. Newton; treasurer, E. B. Bartlett; directors, G. E. Morton and F. P. Mann.

The Republic Iron & Steel Co., Youngstown, O., has sold its Tudor works at East St. Louis, Ill., to the Chicago House Wrecking Co. The sale includes buildings and equipment, with a stipulation that the plant must be dismantled. The equipment has already been offered for sale by the buyer.

The Abbott Ball Co., Hartford, Conn., manufacturer of steel balls, announces that it is now located in its new factory building at Elmwood, Conn., a suburb of Hartford, and advises that although its manufacturing facilities are greatly enlarged, an increased number of orders has necessitated from 15 to 24-hour daily runs.

The Peacocks Iron Works, Attalla, Ala., has organized a stock company with a capital of $150,000, to build a large car and car wheel works, which will include the transferring of its former plant at Selma, Ala., to its present location. At the present time, this company is endeavoring to secure competent men for the office and shops.

The Star Iron Works, Punxsutawney, Pa., changed hands on Jan. 1, and in the future will be known as the Mahoning Foundry Co. The interested parties are experienced in the manufacture of gray iron and brass castings, having been in the foundry business for more than 25 years. W. E. Porter is secretary and G. W. Glispie general manager.

The Orenstein-Arthur Koppel Co., general offices at Pittsburgh, and works at Koppel, Pa., advises that its general manager, A. Riche, is now in Berlin, Germany, where the head office of the company is located, in consultation with the executive officers, with regard to the improvements to be made at the American plant at Koppel, Pa., during the coming year.

The Hartman-Breiling Boiler & Machine Co., Green Bay, Wis., established a record for quick work last week when it fabricated an 80-foot stack, 40 inches in diameter, in less than 2½ working days. Erecting work was commenced 62 hours after the order had been received from the Britton Cooperage Co., of Green Bay, which suffered the destruction of its main stack by a wind storm.

Wm. Sellers & Co., Inc., Philadelphia, manufacturers of machine tools and heavy metal working machinery, have purchased a tract of land along the Baltimore & Ohio railroad at Folsom, Pa., about eight and one-half miles from its present works and are preparing to

remove their foundries to that side. When this removal will be made, it is not yet determined. The tract of land acquired is sufficiently large to permit the establishment of the entire plant of the company there at sometime in the future, if it should be so determined, but the company advises that a current report, stating that it will remove its entire plant to the new location at this time, is erroneous.

The Industrial Development Commission, Pittsburgh, advises a new jobbing galvanizing company has announced intentions of locating in Pittsburgh. The new concern is an off-shoot of Thomas Gregory Galvanizing Co., Brooklyn, and is known as the Hanlon-Gregory Galvanizing Co. A. J. Diebold is president. Thomas M. Gregory, president of the Thomas M. Gregory Galvanizing Co., vice president; William M. Gregory, secretary of the Brooklyn company, secretary; A. J. Loeffer, treasurer, and John A. Hanlon, former president of the Pittsburgh Galvanizing Co., general manager. The new company will take possession of the Totten-Hogg foundry.

General Industrial

The Chicago Steel Car Co., Chicago, has decreased its capital from $250,000 to $125,000.

The Miami Valley Machine Tool Co., Dayton, O., has decreased its capital from $20,000 to $5,000.

The Dickinson Malleable Iron Co., Milwaukee, has filed notice of dissolution.

The Grand Trunk Railway Co., it is reported, will locate shops in the eastern part of Hamilton, Ont.

E. L. Dale is considering the manufacture in his machine shop, at Saugatuck, Mich., of a new spray rod, invented by W. H. Stow of that place.

The new plant of the Pressed Steel Products Co., at Petroleum, O., will be ready to start operations by March 1, according to advice from that city.

Schedules filed by Benjamin Davis, dealer in tin plate, 310 Bowery, New York City, show liabilities of $139,196 and nominal assets of $164,601.

The Rockwood Sprinkler Co., Worcester, Mass., has bought a large tract of land adjoining its present plant, for future development.

The Southern Structural Steel Co., San Antonio, Tex., is planning to establish a plant at Birmingham, Ala. The company operates a plant in San Antonio.

The St. Lawrence Pulp & Lumber Corporation, incorporated in New York State with a capitalization of $4,000,000, will establish a plant costing $2,000,000, for the manufacture of pulp and paper in the province of Quebec. The Canadian offices will be at New Carlisle, Bonaventure county, Que.

Two heating furnaces for the bar mill and four more puddling furnaces at the plant of the Susquehanna Iron Co., Columbia, Pa., were placed in operation recently.

The Canton Steel Castings Co., Canton, O., fired its new 40-ton furnace recently, and soon will begin rebuilding its old 18-ton furnace, increasing it to 25 tons.

The Toronto city council on Jan. 29 adopted by-laws to raise $6,677,000 for an extension of the water works system, and $1,375,000 for a duplication of the filtration plant.

The B. F. Goodrich Co., Akron, O., will build a factory at St. Catherines, Ont., to employ about 1,000 men. The town has given the company 17 acres and fixed assessment of $10,000 for 10 years.

The West Side Iron & Metal Co., Detroit, advises that it is negotiating for the purchase of an additional yard, and expects to add improved facilities, including a railroad scale and cranes.

The Wehr Steel Casting Co., Milwaukee, Wis., manufacturer of crucible steel castings, has placed an order with the Whiting Foundry Equipment Co., Harvey, Ill., for the installation of a side-blow converter.

The Olmstead Engine Co., Great Falls, Mont., is completing and equipping its plant, and will be ready to operate within a few weeks. C. L. Olmstead is president and J. M. Geiger secretary-treasurer.

The Southern Tool & Supply Co., Chattanooga, Tenn., has filed a voluntary petition in bankruptcy in federal court. Total liabilities are scheduled at $1,856,382 and assets at $1,100,320.

The Standard Steel Tank & Mfg. Co., Pittsburgh, has been awarded the contract for all the plate for the flues, connections and dampers for the new Kensington plant of the United States Aluminum Co., Pittsburgh.

The Saltillo Power Co., Saltillo, Mex., recently purchased three large oil engines, two 450-horsepower, and one 100-horsepower, from the Snow Steam Pump Works, Buffalo. These engines operate on the heaviest grade of Mexican crude oil.

The plant and equipment of the Montpelier Cup & Metal Works, Montpelier, Ind., which has been operated under a receivership was sold Saturday, by Receiver Charles Morse, of Hartford City, Ind., for $5,000. The company manufactures flouring mills and oil cups.

The Dominion Steel Corporation has ordered additional machinery to increase the capacity of its wire and rail plants. J. H. Plummer, the president, says this will give an output of over 2,000 kegs daily, and ultimately provide an outlet for the entire product of the wire rod mills.

The Rockford Milling Machine Co., Rockford, Ill., advises that it has built a factory addition, 100 x 80 feet, and has purchased a number of new machine tools. The company also advises that its business is constantly growing, which may necessitate another extension within a short time.

The Washington Iron Works, Seattle, Wash., manufacturer of mill, mining and marine machinery, is installing a three-ton Girod electric furnace in its new foundry, together with complete steel foundry equipment for the manufacture of high grade steel castings. This is reported to be the first electric steel casting plant on the Pacific coast.

The Seberg Tunnel & Rock Planing Co., Racine, Wis., has completed the first models of its rock tunneling machinery for mines, quarries, etc. The machines will be given thorough tests in the large quarries at Racine and the company plans on extensive manufacturing thereafter. The company's engineers are now making final drafts of a rock and boulder planing device.

The Standard Steel Pipe & Mfg. Co., Girard, O., advises that it has secured the contracts for gas mains, gas producer platform, two self-supporting stacks and standpipe, for the Republic Iron & Steel Co., Youngstown, O., and a contract from the Alton Steel Co., Alton Ill., for two self-supporting stacks 125 feet high, and four other stacks, ranging from 60 to 180 feet in height.

Frederick Nicholls, president of the Canadian General Electric Co., who has returned from a trip of inspection through the west, states that the company will increase the size of its office and warehouse building in Vancouver, and early in the spring will begin the construction of a five-story warehouse in Calgary, Alta. A branch office has been opened in Victoria, B. C.

The Collingwood Shipbuilding Co. has closed a contract to construct for the Pelee & Lake Erie Navigation Co., a steel passenger and freight steamer, for the route between Pelee Island and Rondeau Harbor. The vessel will be 145 feet long, 24 feet wide and 18 feet 3 inches deep, and will be driven by triple expansion engines, with cylinders 12½ x 21 x 34 inches in

diameter, and a stroke of 21 inches. Steam will be supplied by one Scotch boiler 12½ feet in diameter and 10½ feet long.

The Watkins Machine & Foundry Co., Hattiesburg, Miss., which recently went into the hands of a receiver, has been sold to W. A. Morriss, of the Dantzler Machine & Foundry Works, and three associates, all of Gulfport, Miss. The old machinery will be overhauled and new machinery installed, which will enable the new management to do repair work. The plant will serve the saw mill trade.

More than $2,500,000 in benefits were paid in 1912 to members of the relief funds of the Pennsylvania railroad system. This was made public recently in a report issued by the company, which also showed that since the funds for both the lines east and west of Pittsburgh were established 27 years ago, $34,785,576.71 have been distributed to members or their families.

The Shirley Radiator & Foundry Co., Indianapolis, is now in the hands of a receiver, the Union Trust Co., of Indianapolis. J. F. Butler, of The Union Trust Co., who is handling the business affairs of the radiator and foundry company, advises that an extensive outlay for the purchase of additional equipment is being planned, this addition to increase the output of the foundry about three times its former capacity.

The Standard Steel Casting Co., Cleveland, which recently took over the plant of the Superior Drop Forging Co., West Seventy-third street and Big Four railroad, and incorporated last month, as noted in THE IRON TRADE REVIEW, is busily engaged in fitting over the two buildings of the newly acquired plant, and is building a converter room, 30 x 40 feet, and a pattern room. The company advises that it expects the converter here within a couple of weeks, and to start casting about March 15.

The Gas Machinery Co., 715 Citizens building, Cleveland, has entered upon the designing and construction of coke ovens and gas oven plants, the type of plant to be known as the "Gasmaco." W. E. Hartman, consulting engineer, with offices at 711 Fort Dearborn building, Chicago, has been retained by the Cleveland company in a consulting capacity. Fred Peiter, formerly assistant engineer of H. Koppers Co., Chicago, is now in charge of the designing and construction department of the Gas Machinery Co. The "Gasmaco" type of coke oven is designed for the complete regulation of the heat at the top of the oven, which enables it to be operated at low coking time without destroying the by-products, this resulting in high yields of ammonia, tars, etc. The officers of the Gas Machinery Co. are: President, Pierre Plantinga; vice president, L. C. Hamlink; secretary and treasurer, B. J. Buthery; T. T. George and L. E. Linsell. The Gas Machinery Co. has been established for 10 years in the business of gas plant construction.

Car Buying

Car orders for the week ending Feb. 1 were as follows:

Pennsylvania Railroad system lines west, 65 locomotives.

Chicago, Minneapolis & Louisville Railway, 2,000 freight cars to the Haskell & Barker Car Co.

New inquiries, as follows, have been sent out:

The Harriman lines, 13,000 cars.

Pennsylvania Railroad, 12,300 cars, including 5,000 steel gondolas, 1,300 wooden-side gondolas, and 1,000 refrigerator cars, for the lines east; and 3,000 hoppers, 1,000 gondolas, 500 box cars and 500 refrigerator cars for the lines west; also 100 locomotives for lines west.

Norfolk & Western, 2,000 cars and 3,000 additional cars later.

The Chicago, Milwaukee & St. Paul, 5,000 cars.

The Atlantic Coast Line Railroad, 1,300 cars.

The Northern Pacific, 6 postal cars.

Chicago & St. Louis Railroad, 4 all-steel passenger coaches.

The Louisville & Nashville, 500 gondola cars.

The American Steel & Wire Co., 25 gondolas.

The B. & O. R. R., 1,500 cars.

Miscellaneous

The Globe Auto Sprinkler Co., Cincinnati, is installing a sprinkler system in the plant of the C. R. Wilson Auto Body Co., Detroit, Mich.

The Bethlehem Steel Co. has received 27 guns of 5, 6, 9 and 12-inch caliber in use on United States battleships for the purpose of relining and reboring them.

The Phelps-Dodge Co., Tucson, Ariz., is reported to be preparing to expend $1,000,000 in developing the copper properties of the Conchise Co., of which $500,000 will be expended in a concentrating plant.

The final account of Nicholas Klauk, assignee of the Marinette Iron & Mfg. Co., Marinette, Wis., shows that the assignee not only expended $192.63 more than was at his disposal, but has not received any compensation for his services, which amount to $2,892.31. The Marinette company went into bankruptcy in 1903 and the assets were $6,028.68.

Royal Mattice, of the American Steel & Wire Co., spent some time in Cincinnati, recently, in an endeavor to induce manufacturers of that city to safeguard their employes from accidents through the adoption of an universal danger sign, that could be understood by workmen of all nationalities. He gave as an example the large red bull's eye now used by the United States Steel Corporation.

The board of United States general appraisers has sustained the protests of F. B. Vandegrift & Co., and H. G. Hempstead & Son for a reduction of 20 per cent in the duty laid upon entries of scrap iron recently brought into Philadelphia from Cuba. The importers contended that they were entitled to the reduction by virtue of the reciprocity treaty with Cuba. For some time merchandise of this character coming from Cuba has been admitted at the port of New York at 20 cents less than the regular rate. The collector of the port of Philadelphia is directed to re-liquidate the entries and assess the lower duties.

Fires

Damage estimated at $800 was done by fire at a warehouse of the Wrought Iron Range Co., St. Louis, recently.

The bolt shop of the Illinois Car & Equipment Mfg. Co., at Chicago, was badly damaged by fire, Jan. 27. The loss is estimated at $25,000.

J. M. Bateson's woodworking plant at Calgary, Alta., was burned to the ground recently. The loss, amounting to $60,000, is covered by insurance.

The plant of Thomas Yearsley Co., electrical machinery manufacturer, Philadelphia, was damaged by fire Jan. 28.

Serious damage was done by fire at one of the plants of the Herzog Iron Works, St. Paul, Jan. 27. Loss on machinery is said to have been quite heavy.

The plant of the Chisholm & Moore Mfg. Co., Cleveland, was slightly damaged recently by a fire which started in the core department. Work in all departments has been resumed.

The Dominion Stamping Works, Walkerville, Ont., were considerably damaged on Thursday night, Jan. 30, by fire which originated from an unknown cause in the enameling room. The damage amounted to about $6,000.

The Dutcher works of the Prime Steel Co., at the foot of Mitchell street, Milwaukee, were damaged about $30,000 by fire originating from unknown causes in the core room, on Saturday night, Feb. 1. The roof of the foundry, 100 x 200 feet, was almost totally destroyed. The pattern storage house and pattern shop were saved.